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THE

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DIFFUSION OF USEFUL KNOWLEDGE.

VOLUME XXIII.

STEARIC ACID—TAGUS.

LONDON:
CHARLES KNIGHT AND Co., 22, LUDGATE STREET.

MDCCXLII.

Price Seven Shillings and Sixpence, bound in cloth.
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STEARIC ACID. This substance is procured from stearin (Stearin), which is a compound of stearic acid and a peculiar sweet substance called glycerin, which is treated of under the head of Soap.

When stearin is saponified by potash, stearate of potash is procured; and when warm dilute hydrochloric acid is added to the solution, the stearate is decomposed, chloride of potassium remains in solution, and the stearic acid is precipitated.

The properties of this acid are, that it has the form of brilliant white scaly crystals; it is inodorous, tasteless, insoluble in water, soluble in its own weight of ether and in hot alcohol, and the solution redds titius-paper; but its acid action is feeble, for it expels carbonic acid and forms the alkaline carbonates only at a boiling heat. It melts at about 158° Fahrenheit, and on cooling it forms a crystalline mass; it is volatile, and may be distilled unaltered in close vessels. In the air it burns like wax. Its composition is somewhat differently stated by authors, but no one statement differs much from—

<table>
<thead>
<tr>
<th>Equivalents of Carbon</th>
<th>68</th>
<th>79.4</th>
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<tbody>
<tr>
<td>Equivalents of Hydrogen</td>
<td>66</td>
<td>12.8</td>
</tr>
<tr>
<td>Equivalents of Oxygen</td>
<td>5</td>
<td>7.9</td>
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</tbody>
</table>

Equivalent 514

In the state of crystals it contains two equivalents of carbon, weight 16, or nearly 34 per cent. It forms compounds with the alkalies, earths, and metallic oxides, which are called stearates of ammonia.

Stearate of Ammonia.—Stearic acid absorbs ammoniacal gas; the resulting compound is white, inodorous, and has an alkaline taste. It is dissolved by boiling water, and the solution, on cooling, deposits pearly crystals of stearate of ammonia.

Di-stearate of Potash is formed by boiling equal weights of the acid and alkali dissolved in five times their weight of water. It forms a white granular compound, which is opaque, and may be purified by solution in boiling alcohol; as the solution cools, the salt separates in white brilliant scales. This compound may also be procured by treating potash soap with alcohol.

It is composed of—

| One equivalent of stearic acid | 514 |
| Two equivalents of potash      | 96  |

Equivalent 610

Stearate of Potash is obtained by dissolving one part of potash soap made with suet and caustic potash, in six of hot water, and then adding about ten times their weight of cold water to the solution; the precipitate which results contains the stearate of potash mixed with margarite of the same base; from the latter it is separated by repeated treatment with alcohol, and is then obtained in soft silvery crystalline scales.

P. C., No. 1423.

It is composed of—

| One equivalent of stearic acid | 514 |
| One equivalent of potash      | 48  |

Equivalent 562

Di-stearate of Soda and stearate of soda may be obtained by processes similar to those described for the stearates of potash; they are less soluble than the salts of potash, and enter into the composition of hard soaps.

Stearate of Lime, Stearate of Baryles, and Stearate of Lead, are all white insoluble powders, and are not applied to any useful purpose.

Stearic Acid, besides its use in the manufacture of soap, is now very largely employed in the making of candles. STEARIN (from eirip, fat) is the harder portion of animal fats; olein, or elain, being the softer one. To obtain stearin in a pure state, mutton-suet is to be melted with ten times its weight of water in a water bath; as the solution cools, crystals of stearin are deposited, which, after washing with cold water, are to be strongly pressed. The properties of stearin are, that it has a pearly lustre, is soft to the touch, but not greasy; it melts at about 149° to 145° Fahrenheit, and, on cooling, solidifies into a mass, like wax, which is not crystalline in its texture, and is reducible to powder. Stearin is insoluble in water, but is dissolved both by hot alcohol and ether, from which it almost entirely separates on cooling; it possesses weak acid properties, and may be combined with potash; it is the chief and most important ingredient of the harder kinds of fat, and the harder they are the more they contain.

Stearin is separable into two different principles, namely stearic acid and glycerin, and has already been noticed in the preceding article; it appears to be a bis-stearate of glycerin, consisting of—

| Two equivalents of stearic acid | 1028 |
| One equivalent of glycerin      | 83  |
| Two equivalents of water        | 18  |

Equivalent 1129

The composition of stearic acid has already been given: glycerin is composed of, probably—

| Six equivalents of carbon       | 36  |
| Seven equivalents of hydrogen  | 7   |
| Five equivalents of oxygen     | 40  |

Equivalent 83

STEARON is obtained by the partial decomposition of stearic acid; when distilled with lime, carbonic acid is formed, and the stearon produced at the same time is volatile, and condenses in the state of a volatile liquid: it appears to consist of—

| Sixty-six equivalents of carbon | 396 |
| Sixty-six equivalents of hydrogen | 66  |
| One equivalent of oxygen       | 8   |

Equivalent 470

VOl. XXIII—B
So that it seems to be steeric acid deprived of two equiva-

lents of carboxylic acid.

STEAROPTEN. Volatile oils, as obtained by distillation
from plants, appear, like expressed oils, to consist of two
substances; one solid, which has received the name of stea-
opten, and the other liquid, called elaopten: the former
generally crystallizes when the oil has been long kept.

Camphor is the most remarkable substance of the class of
stearylpten. It is obtained by distillation with water, and
in the plant is mixed with camphor-oil, from the gradual
oxidation of which it appears to be produced.

STEATITE, Soapstone, Speckstein, Talc-Stone. This
mineral is formed by a hydrous silicate of mag-
nesia, is met with in massive and amorphous masses, which
sometimes contain crystals of this kind of the form of
quartz and calcareous spar, and which are probably pre-
domorphous. Structure compact. Soft, and it has some
signs of a split. Colour yellowish, greenish,
and greyish-white. Streak shining. Dull. Trans-
cent on the edges. Specific gravity 2.694 to 2.632.

Before the blowpipe it is fusible either alone or with
additions. It occurs plentifully in Bainbre, Saxony; in
Cornwall, in Scotland, and many other parts of the world.

According to Klaproth it consists of,

<table>
<thead>
<tr>
<th></th>
<th>Bainbrith</th>
<th>Cornwall</th>
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<tr>
<td>Silica</td>
<td>71.0</td>
<td>45.0</td>
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<tr>
<td>Magnesia</td>
<td>30.0</td>
<td>24.75</td>
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<tr>
<td>Alumina</td>
<td>0.0</td>
<td>9.25</td>
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<tr>
<td>Oxide of iron</td>
<td>2.0</td>
<td>1.0</td>
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<tr>
<td>Water</td>
<td>5.0</td>
<td>18.0</td>
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STEEL. Iron possesses many qualities which render it
applicable to innumerable purposes in the arts; but there
are some uses for which it is not sufficiently hard, and that
defect is supplied by converting it into steel.

At Eisenarzt in Styria the manufacture of steel has been
carried on ever since the eighth century, and yet the exact
nature of the process is by no means understood. It is
generally admitted that steel is an inti-
mate compound of iron and charcoal, for soft iron contains
a considerable portion of charcoal, and it is by no means
clear that the quantity is increased in the process of steel-
making, and therefore we must conclude that some more
intimate union is effected between them when iron is con-
verted into steel. Whatever the theory may be, we shall
now describe the mode in which the operation is conducted
in this country, and principally at Sheffield.

In the first place, it is to be observed, that hitherto Swedish
and Russian bar-iron have been exclusively employed in
the manufacture of the best steel; the preference given to
this iron is decided, though from what cause it arises has
not been satisfactorily made out. It may however remark,
that the foreign iron used is made from magnetic iron ore
with charcoal, while British iron is obtained mostly from
the impure carbonate of iron, called argillaceous iron-ore,
or from hematite, which is a peroxide of iron, and both of
these are reduced by employing coal or coke prepared from it.

Bar-Steel is made, with few exceptions, from the Swedish
and Russian iron, the bars of which are marked hoop i (1),
gl (2), and double bullet (3); these, which are the best kinds,
fetch from 31½ to 35½ per ton. Iron of lower quality
is also used, such as (4), which is a Russian iron, and (5)
crown (5), and crown (6), which are Swedish iron; these
cost the importer about 20½ per ton; whilst there is a medium
quality at about 23½ per ton, vis. w and crown (7), b and

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The usual iron in large steel-works is first to cut the
bar-iron into certain lengths, leaving room in the vessels
for the expansion of the iron, which amounts to a
The closed vessels in which the bars are heated are usually twelve
feet in length, and divided into two portions or troughs. The
iron is then heated to a ferruginous state, and put in the steel-
urn, with a charge of sand. When the iron has been heated
to the required degree, it is removed to the crucible, which
is at its full heat, at which it is kept for several
days, according to the degree of hardness required.

In order to be able to test the progress of the carbonization,
a hole is left in one of the pots or vessels, and three or
four bars are placed in the furnace in such a manner that
the ends come through this opening, and after the sixth day
one is pulled out. If the bar iron be not sufficiently car-
bonized, the heating is continued from two to four days
longer: a ton of bar iron, when every piece is completely
converted, the fire is heaped up with small-
coal, and the furnace is left to burn out, and it requires
this period fourteen days' time to cool sufficiently to
allow a person to go in and discharge the steel.

It is of the greatest importance that the pots or troughs
be kept completely air-tight; the smallest crack will open
when the furnace is hot, and admit the air: this of course
frustrates the object of the operation, and any steel which
has thus suffered is placed aside and to be recovered. It is
of the greatest importance to give the iron the exact quantity
of carbon required and no more.

1st. For coach-springs. The iron must not be converted
in the centre.

2nd. For common cullery, singie and sheer steel, and for
purposes where steel has to be welded to itself or to iron, the
conversion should be low, and gradually disseminated
throughout the whole thickness of the bar.

3rd. For double sheer steel— the conversion should be
somewhat harder than the preceding.

4th. For files and all instruments where resistance or
fine cutting-edges are required, the conversion should be
hard, and the iron fully carbonized throughout the bar,
and the fracture should present small facets.

No definite rule can be laid down for any other, nor can any
distinct instructions be given to enable the uninitiated to judge
of the temper or degree of hardness of a bar of steel; but by
habit workmen soon acquire the means of distinguishing
the temper of a bar, as well as the hardness of its two pieces.
This knowledge of the degree of temper is of great
importance to the steel-maker, for though he is enabled to
adapt the temper (hardness) of the steel to the wants of the
manufacturer, a file, made from soft steel which would be
valuable for welding purposes, would be useless in this,
and a coach-spring made from steel hard enough to make a
file could not be applied to its intended purpose.

A converting furnace contains generally fifteen tons of
iron; and there are some large enough to hold eighteen
to twenty tons. The bar-steel, when discharged from the fur-
nace, is partially covered with small raised portions of
metal; and from the resemblance of these to blisters, the
steel is called blistered steel. It has been supposed that
these blisters are caused by the expansion of some oxide
formed and confined during the process of carbonization;
this however is not the case, for they evidently arise from
the unsoundness of the iron, which is not throughout perfectly
welded.

It has been found by the experiment of placing a bar of
Swedish and one of Staffordshire bar-iron in the same fur-
nace, that the former was much blistered, while the latter
had scarcely any blisters larger than a peb. It must how-
ever be admitted that the cause of the blistering in one case,
and of the steel without blistering in the other, are circumstances
difficult of explanation.

At one time it was common for the steel-maker to receive
orders for steel well blistered. This arose from a mistaken idea
regarding the perfection of the steel, it being supposed that
the more it was blistered, the more it was carbonized, and

* A patent has lately been obtained by Mr. Charles Roberts, for making
iron fit for conversion into steel, from some instruments made from the steel
so produced, now in the possession of the writer of this article, he is inclined
to think favourable of the process.
they are then placed in a hollow forge fired by a soft blast, and heated gradually to a full welding heat, during which the workman covers the surface with clay beaten very fine; this runs over the surface, and to some extent prevents oxidation. When fully heated, they are placed under the hammer, carefully welded together and drawn into a bar of about inch in thickness, then half, which is annealed by hammering or rolled to the size required; by this process bar steel becomes more homogeneous, of a finer texture, and any instrument made of it will receive and retain a finer edge; the steel is also more homogeneous, the middle or heart, as it is termed, is increased in mass and the abstraction of a small portion of carbon, and the mechanical elongation of the fibre by these doublings. &c.

Manufacture of Cast Steel.—The fabrication of cast steel is comparatively a recent invention, it was first made by Mr. Hartmann, at Attercliff, near Sheffield, in 1770, since which time the manufacture of it has very much increased, and it is daily superseding the use of bar or sheet steel, on account of the equality of its temper, and the superior quality as well as beauty of the articles which are made of it. The process applied is that of taking the bars, softened and converted to a certain degree of hardness and breaking it into pieces of about a pound each; a crucible charged with these is placed in the melting-furnace, similar to that used by brassesmiths, into which the iron is placed in the bottom, and another bar, which is usually about 40 feet long, is rolled to the size required; by this process bar steel becomes more homogeneous, of a finer texture, and any instrument made of it will receive and retain a finer edge; the steel is also more homogeneous, the middle, or heart, as it is termed, is increased in mass and the abstraction of a small portion of carbon, and the mechanical elongation of the fibre by these doublings. &c.

The degree at which the respective colours and corresponding hardness are produced being thus known, the workman has only to heat the bath and its contents up to the required point. The degree of hardness attainable by steel depends upon the temperature to which it is raised, and the coldness or conducting power of the liquid into which it is immersed; so that, for instance, whenever the process of tempering cannot be procured, the steel die or other article must be heated proportionately high; a dull red heat into water at 10°, a cherry-red into water at 50°, an orange heat into water at 80°, a dull white heat into water at 100°, produce nearly the same effects: a red heat and water at 212° is the most desirable for the hardening; and although by subsequent tempering the die may, if necessary, be brought down or softened, it is always safest to give it due hardness by the first operation. In some cases steel is sufficiently hardened before any change of temper is produced. Capt. Kater found that 212°, the heat of boiling oil, was the exact point at which the knife-edges attached to a pendulum were properly tempered. The colour produced on the surface of the steel is sufficiently diagnostic of its quality; and it is stated in corroborative of this opinion, that when steel is heated and suffered to cool under mercury or oil, none of the colours appear; nor do they when it is heated in hydrogen or azotic gases; the cause however of the

sourced as a steel-grey: it is susceptible of receiving a very high polish, and this is greater as the grain is finer. The density of steel before hammering or hardening varies from 7.3 to 7.84; Dr. Thomson found the density of good blistered steel to be 7.85, by heating it to redness and sudden immersion in cold water, the density was reduced to 7.74: a piece of soft cast-steel similarly treated was reduced in density from 7.82 to 7.732. It follows therefore that the volume of steel, and as the steel is heated to redness and slowly cooled, it is scarcely larger than iron; but by very rapid cooling it becomes hard, and so brittle as to be readily broken. The fracture of steel is usually fine grained, in ductility and malleability it is much inferior to iron, but needs it greatly in elasticity and sonoroua. It may be subjected to a full red heat, or 276° Fahr., without melting; and is therefore less fusible than cast-iron, but much more so than wrought-iron. Pieces of steel which have not been cast may be readily welded together or with iron; but after casting the operation is more difficult. Steel does not acquire magnetic polarity so readily as iron, but retains it much longer; by exposure however to a moderate degree of heat this power is lost.
different degrees of hardness produced at the same time with the changes of colour has not been hitherto satisfactorily explained.

Case-hardening is the operation by which articles made of malleable iron or cast-iron are superficially converted into steel by heating them with charcoal in a crucible.

With respect to the composition of steel and the nature of the admixture requisite to constitute it, differences of opinion have long existed, and the question even now is considered by some as not yet decided, whether carbon is indispensably necessary to its formation, and whether certain substances or metals, especially silicon, may not give rise to it; and it is generally admitted that phosphorus is always present.

Berzelius mentions iron containing manganese as particularly eligible, and says that analyses which shall presently state show that this metal is not present in steel in most cases; but we have understood that it is so in the steel made in Germany from spathose iron-ore, or carnobate of iron.

An experiment performed and described by Mr. Pepys in the 'Phil. Trans.' for 1815, seems not only to prove the necessity of carbon, but also that the diamond is capable of producing the same effect. In order to get rid of the objection that the carbonaceous matter of a common fire might suffice when iron and diamond were heated by means of it, he placed diamond-powder in a piece of pure soft iron wire; and having properly secured it, he heated it by means of voltaic electricity: after a few minutes' heating, the diamond had disappeared, and the interior surface of the wire was so covered with phosphorescent steel, which, being heated to redness and plunged into cold water, became so hard as to resist the file and scratch glass.

Some years since also a method was discovered by Mackintosh of converting iron into steel by means of the carbon of carburised hydrogen gas.

The following are the results of four analyses of the cementation of steel of Rennelsdorf, department of the Moselle, by Vauquelin:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>98.72</td>
</tr>
<tr>
<td>Carbon</td>
<td>0.79</td>
</tr>
<tr>
<td>Silicon</td>
<td>0.15</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.34</td>
</tr>
</tbody>
</table>

It appears from the following analyses of cast-steel by Gay-Lussac that during fusion the steel loses much silicon and a little carbon: the samples analysed were (1) English, first quality; (2) French, first quality; (3) French, second quality; (4) Idro, 1822.

In the opinion of Mr. Brande, the quantity of carbon in the cast-steel was probably too great; and he found that when the carbon has fallen short of one per cent, the steel was deficient in hardness; and when it has exceeded this proportion, the dies have split or not stood their work. He states, at the same time, that minute quantities of other bodies appear to influence the quality of steel; and that unless it contain phosphorus it cannot be depended on for the manufacture of dies in coinage.

Dr. Thomson examined some cast-steel furnished him by Mr. Buttray, a steel-maker near Glasgow: the general result of his trials gave him:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>99</td>
</tr>
<tr>
<td>Carbon</td>
<td>0.99</td>
</tr>
</tbody>
</table>

and this composition, he observes, approaches 20 atoms of iron + 1 atom of carbon, and this he thinks likely to be the constitution of cast-steel, an opinion corroborated by the fact above stated by Mr. Brande.

Mr. Faraday and Mr. Stodart published in the 'Phil. Trans.' for 1822 a valuable series of experiments on alloys of steel, from which it appears that by combining steel with other metals its quality is improved: for the details we refer to the memoir, merely stating that a very minute addition was found sufficient to produce a good effect: thus one per cent of silver gave an alloy harder than cast-steel; one 100th of nickel gave a very hard alloy, susceptible of a fine polish: alloys of rhodium and platinum were also formed; and these, with the alloys of iridium, osmium, and palladium, formed the most valuable compounds.

STEEL ENGRAVING. In the article Engraving (vol. ix. p. 437) the history of the art of engraving upon metallic plates for the purpose of producing impressions, in ink, upon paper and other substances, as well as the chief points requiring notice in the practice of the art, has been treated of; and therefore it merely remains in this place to notice the use of steel plates, which have of late been very extensively and advantageously substituted for those of copper.

As far as regards facility of execution, whether by etching or by cutting with the graver, probably no material could be found which will surpass the perfection which is still performed by many engravers, where the fine and free character of the work is more important than the durability of the plate; but the comparative softness of copper occasions it to wear so rapidly in the process of printing, that the beauty of the engraving is very soon impaired, and it is impossible to produce, from a single plate, a sufficient number of impressions for the illustration of books of large circulation. It should be borne in mind that, in copper-plate printing, the metal is not only wasted by the process of hardening the ink, which is rubbed into the lines with a bale of cloth applied with considerable force. The superfusious ink is then wiped off with a rag, and the surface of the plate is thoroughly cleaned by repeated wiping or rubbing with the hand, when the initial impression is removed or incisions in the plate, from which it is transferred to the paper by very powerful pressure in a rolling-press.

This operation, being repeated with every impression, tends to the rapid deterioration of the plate, the surface of which would wear down to a constant consistence with the lines soon disappear, while the edges of the widest and deepest incisions become so rounded that they will not contain the proper quantity of ink. Hence it becomes necessary, where many impressions are required, to deepen the engraving by a few hundred copies; but even this measure, troublesome and expensive as it is, will not restore the engraving to its original beauty. The use of steel plates for diminishing this inconvenience, although not extensively substituted until the last half a century, is a measure of which the possibility was conceived at an early period. It is believed that Albert Dürer, who also made experiments upon plates of tin, silver, &c., engraved a few steel plates; impressions of which, or of some of which, are perhaps to be found in the collection of the present artist in the British Museum. They appear to be executed chiefly, if not entirely, by the process of etching. Probably many other engravers may have tried engraving upon steel, but the difficulty of cutting it, and anxiety of its hardness, and the good memorandum for the purpose of etching, prevented the accomplishment of anything important in steel engraving until recently.

The introduction of the modern set of steel engraving appears to have been the work ofMr. W. Warren, who has caused an excitement which existed rather more than twenty years since on the subject of the forgery of bank-notes. That subject was investigated in 1818 by a committee of the Society for the Encouragement of Arts, Manufactures, and Commerce, who received several proposals for rendering bank-notes more difficult of imitation; and the very interesting communications made to the committee were published by the Society in 1819, as a supplement to their 'Transactions.' The introduction of superior workmanship in the engraving of plates for bank-notes was one of the measures particularly recommended on this occasion; but, while it was shown that the employment of superior engravers, and the introduction of well-executed vignettes, had been found advantageous in the case of preventing forgery, it was a measure inapplicable to the small notes then circulated in immense numbers by the Bank of England, which were the notes most extensively forged. It is in evidence, observe the committee, 'that the average number of notes on which such a precaution does not much exceed six thousand;' hence, if the expense

* Mr. Warren stated that about seven thousand copies were taken by the Bank of England before the copper plates used by them required to be replaced; it seems that the papers mentioned for a few years forebore the number of impressions which each plate would afford. It is almost needless to observe that the great difference in the quality and life of impressions, the former being so limited, is one of the reasons why it was deem-

it more difficult for an inexperienced person to detect a forgery than it would have been if no observable difference existed between the genuine notes.
of engraving were greatly enhanced, the profit arising from the issue of one-pound notes would entirely cease." 'If it proceeds, ' the daily issue of small notes from the Bank of England amounted to thirty thousand,—and, from the evidence produced, there is reason to believe that it exceeds rather than falls short of this number,'—there is a daily consumption of five plates, or fifteen hundred in the year; and there might perhaps be some difficulty in finding a sufficient number of impurities to prevent the frequent recurrence of quantity of plates.' The substitution of steel for copper is then adverted to as a measure likely to obviate these difficulties, because, owing to its greater hardness, it was believed that a steel plate might be used to afford thirty, or perhaps thirty-five, impressions of good quality without an impression of copper would have; so that, while perfect similarity might be insured in a much larger number of notes, a far greater expense might be advantageously incurred in the engraving of each plate. Mr. J. T. Barber Lamont, in his communication to the committee, after alluding to the ultimate economy of the plan, notwithstanding the increased cost of the proposed steel plates with well-executed vignettes, as compared with the badly engraved copper-plates then used, which contained nothing worthy of the name of a work of art, observed:—

'A further effect of this system in preventing forgeries would be found in all the notes of one kind for a long period of years being taken from one plate, whereas a person having a genuine note might compare it with the minutest of another and thus be able to detect any forgery; or, it was said, the artist himself who had engraved an original plate to follow, in a copy, the length, sweep, depth, and number of the strokes in his original, a detection would be easy. But, as this cannot be done, the artist has only to prevent the artist from doing it; as the artist is not likely to do it.

The conditions of this argument, although unsatisfactory to the extent here intimated by the use of soft steel plates, might be perfectly accomplished by the transferring process hereafter described. Mr. Warren exhibited to the committee a specimen of engraving with soft steel, which fully proved its practicability; and it was also explained by several witnesses that a block or plate of steel might be softened so as to render it easy to cut, and subsequently hardened to enable the artist to better resist wear in printing. Something of this kind indeed was shown in the instances of the four cockerels, in which the bank-notes were shown to the committee, containing ornamental borders, partly of machine-work, which were pronounced not to be "secrecy, if at all, imitable by the common process of engraving." Mr. Glyn, a gentleman who had been engaged in the production of bank-notes in the United States, stated that these borders were engraved upon thick plates of soft steel, and proceeded to describe the process as follows:—'After the pattern has been completed, the plates are introduced or, rather, the impressions taken from it, to a reverse on rollers of very soft cast steel, by repeatedly passing the plate between the rollers. The rollers are then hardened, and from these the impression is transferred to plates of copper, on which the writing and vignettes are engraved after the ordinary way.'

The Report of the committee was accompanied by impressions from two steel plates, engraved by Mr. Williamson. They consist of engine-turned patterns; and, although not remarkably delicate, are very well executed.

The remuneration of cash payments by the Bank of England, and the consequent discontinuance of small notes, rendered the proposed improvements less imperatively necessary; yet steel plates have been, since the date of this Report, employed in many cases, and are extensively used in other matters in which writing and ornamental machine-work form the principal feature, and for engravings of higher character. The principal improvements by which this very important change has been effected, are recorded in that Paper, entitled "The Improvement in Steel Engraving," and that association has done much to encourage the progress of steel engraving. In noticing some of the chief improvements in question, a distinction will be made between the process of engraving on decarbonised steel, and that of engraving upon such plates of soft steel as are printed from without hardening.

The former of the process introduced into this country, in connection with the transferring operation above noticed, and that the process of transferring is precisely the same, whether the print is made from a steel or a copper plate. It is thus employed in the production of the great number of bank-notes in circulation throughout the United States. Their method of producing engraved steel-plates was established in England soon after the date of the Society's Report; Mr. Charles Heath, the eminent English engraver, being associated with the American artists; and it is fully described in a communication from the three partners to the thirty-eighth volume of the 'Transactions' of the Society of Arts, whence it was transferred to several other works. The engraving is executed upon a plate or block of cast-steel, which, to prevent the tendency of warping, is kept at a tolerable temperature. The eightieth of an inch is stated to be the average thickness of the plates used by Mr. Perkins. The surfaces of this plate are decarbonised by placing it in a close cast-iron box, with a sufficient quantity of iron-dusts to cover the plate to the thickness of an eighth of an inch, and then kept warm, and thus enclosed, to a white heat, until the steel is decarbonised, or converted into very pure soft iron, to a depth equal to about three times the depth of the incisions to be made in executing the impressed engraving. The box is then cooled very slowly, being covered up with fine cinders to prevent the access of air. In performing this process, it is said that the plates are least likely to warp when in a vertical position; and that it is advisable to decarbonise each side of the plate equally. On the plate thus softened the engraving is effected with facility; and, when it is completed, the hardness of the surface is restored by exposing the plate for some hours to a red heat, the surface being thickly covered with animal charcoal, formed of bone, or burnt rye-malt, and placed in the same box, which is thus enclosed in a cast-iron box. The plate is afterwards cooled in water; but it is not allowed to remain in the water till quite cold, but taken out so soon as it is cooled to the temper-
difference between the original and the transfer. Even the early specimens which accompany the paper above referred to, fully justify this remark. The plan has been much used for country bank-notes and similar purposes, and has been occasionally resorted to for engravings of pictorial character, for which the kind of steel engraving yet to be noticed is most commonly employed.

The application of steel engraving to matters of fine art is, in a great measure, due to the late Mr. Charles Warren. In 1823 that gentleman made a communication upon the subject to the Society of Arts, who voted him their large gold medal for improvements in the art; a prize which he did not live to receive. Owing to his death before the rewards of that year were bestowed, the Society were deprived of the pleasure of bestowing this important distinction on a man who had been so distinguished in the application of his plan to plates suitable for engraving; because, if they were made thin, like ordinary copper plates, they were liable to warp in hardening; while if thick enough to avoid this danger, it was impossible to beat up the surface from the point of the engraver's needle, or to force the surface of the soft plate into the faults of a driven screw at the back. These inconveniences led Warren to try the durability of steel plates when printed without hardening. It was ascertained that such plates would yield a good impression with a much less degree of process for a necessary purpose; while, by dispensing with the hardening process, they might be made thin enough to allow of beating up without inconvenience.

Prints were exhibited to the Society from two soft steel plates engraved by Warren, containing very delicate work in landscape and arabesque, and which were in the same state after four and five thousand impressions had been taken respectively, and yet between one of the first and one of the last copies there was no perceptible difference. Some other of the specimens printed for the 'Evolution', printed twenty-five thousand copies, and yet remained in good order; and in another case the engraver's proofs were not taken till twenty thousand copies had been printed.

Warren's original mode of decarazoning steel plates was almost paralleled by Professor Turrell in 1822, by a process which was, at least, more perfectly developed. Turrell's process is as follows. The steel was filled with a mixture of iron turnings and pounded oyster-shells, instead of simply iron filings, and that several plates were laid in the same box, alternating with layers of the decarazoning mixture. Mr. Hughes, a copper-plate maker, improved upon this process by substituting a box of refractory clay for the cast-iron box; by which means he was enabled to apply a degree of heat that would have melted the iron, and thereby soften the plates more conveniently. The temperature was not required to be as hot as to soften it to the required degree; and Warren rectified any accidental warping by striking the plate with a hammer between these operations. Hughes found it better to perform this operation with a mallet, and to apply that with as little force as possible. The advantage of the process as it was used by him was the complete absence of distortion in the surface of the engraved plate.

It is recommended that the surface of a steel plate should not be polished very highly, and that in applying etching ground to it, the plate should not be heated quite so much as is usual with copper. In either case the ground is apt to graze, and when the impression is applied, the action of the cooling. The ground should also be laid rather thicker than upon copper. Warren tried several different engravings, but that which he most approved consisted of half an ounce of copper /4 inch thick. The solution is made up by mixing a pint and a half of distilled water, with a few drops of nitric acid added to the solution. He recommended that it should be laid on the plate in a layer not exceeding one-sixth of an inch deep, to enable the operator to see the action distinctly; and that the plate should be constantly swept with a camel-hair brush, to remove the precipitated copper, which, if left in the lines, would render them rugged. When this kind of plate has been employed, it is usual to polish the Brunswick black or other varnish used for covering such parts as are sufficiently etched, or bitten in, very smoothly; because anything like a ridge retains the deposited copper, and where it remains the ground is liable to give way.

In 1824, Mr. Turrell published 'Transactions,' dedicated to Mr. Edmund Turrell, for his improved menstrum for etching on steel, by which the inconvenience of sweeping away the copper was avoided. It consists of four parts by measure, of the strongest pyrogallic (acetic) acid, and one part of pure nitric acid, which should be mixed, and gently agitated for about half a minute, after which one part of pure nitric acid should be added. The rapidity of the process of etching may be increased by dissolving small quantities of nitric acid in the mixture. This menstrum should not be mixed long before it is wanted, as it deteriorates by keeping many hours. After etching, the plate should be washed with a mixture of one alcohol to four water. Turrell also recommends that Egyptian asphalt should be used for stopping out, as the common Brunswick black of the shops is affected by alcohol. In 1826, the Society rewarded Mr. Humphreys for a menstrum for soft steel, consisting of a quarter of an ounce of nitric acid, and a mixture of pyrogallic, or of a mixture of the two, powdered, in half a pint of hot water, but cooled before it is applied to the plate. This menstrum should be kept constantly stirred with a camel-hair brush while acting; when the operation is complete, the work, be thrown away and renewed after acting a short time. This menstrum has received the sanction of several eminent engravers. Some engravers, we believe, use two different kinds of menstrum for etching on steel, one for thin plates, and another for etching the parts that require considerable depth.

Allusion has been made to the difficulty experienced by the early steel engravers in consequence of the hardness of the metal, which rendered it very inconvenient to cut, and for which they were not provided with a necessary tool to make the work, be thrown away and renewed after acting a short time. This menstrum has received the sanction of several eminent engravers. Some engravers, we believe, use two different kinds of menstrum for etching on steel, one for thin plates, and another for etching the parts that require considerable depth.

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that a coat of wax, when gently rubbed over it, leaves a thin but perfect film upon it.

The cost of engraving upon steel is considerably greater than that of engraving upon copper;* yet, as steel plates afford so many more impressions than copper, they enable the publisher, by calculating his returns upon a long production, to make a profit upon the principle above stated, in so low a price as may ensure their very wide circulation. This may be illustrated by referring to the series of maps published by the Society for the Diffusion of Useful Knowledge. The cost of production in this and in every similar case, may be divided into two parts: the cost of engraving, printing, &c., which is a fixed sum, independent of the number of impressions required; and the cost of paper and printing, which is a fixed sum for each impression, whether the impression be large or small. The latter part of the charge therefore increases in proportion to the number of impressions, but the former must be incurred alike for twenty or two thousand copies, and may be met by a large sum added to the price of each copy in a small edition, or by a small sum charged upon each copy in a large edition. Had the Society calculated upon a sale of only two thousand copies of their maps (which was the utmost number that experience would have entailed them to hope for), the estimate would have stood somewhat as follows:

- Assumed cost of authorship
- Assumed cost of engraving (on copper)

Expenses dependent upon the number of copies printed

| Paper for two thousand copies | £5 0 0 |
| Printing two thousand copies | £8 0 0 |

Dividing these sums by two thousand, it will be seen that the cost of paper and printing for each copy is about 1's6d., and the proportion of the total charge to each copy is 3-40d., making the total expense of each copy over 7d. But before the unusual addition of one-third for the profits of the retailers, the price to the public could not have been less than 10d. Supposing the number sold to be four thousand, the total cost per copy would have been reduced to 2-40d., because the expense of the plate, being distributed over double the number of copies, would have been but 2-70d. for each. But this number of impressions would have worn out a copper plate, even supposing, which would be an extreme case, that so large a number could have been printed without the consumption of the engraving. The Society however determined upon going to the greater expense of steel plates, which the engraver undertakes shall be capable of furnishing twenty thousand copies; and they calculated their returns upon a sale of eight thousand copies. The estimate of first cost therefore stands nearly as follows:

- Assumed cost of authorship
- Cost of engraving (on steel) at least

Expenses dependent upon the number of copies printed

| Paper for two thousand copies | £5 0 0 |
| Printing two thousand copies | £8 0 0 |

but by dispersing this larger sum over a number of eight thousand copies, the proportion chargeable to each is reduced to 1's6d., which, with 1's6d. for paper and printing, makes the total cost of each copy 2 40d., or rather less than 2 30d., more than sufficiently profitable in the present state of the market. The writer is aware of the addition of a wrapper, at 6d. each. The result has fully justified this measure, as, of some of the earlier numbers, upwards of twenty thousand copies have been sold, a number which the best engraved plates have yielded without perceptible injury. The sum mentioned as the cost of engraving is about the least which has been paid; but assuming it to be the cost, the proportion of first cost chargeable on each copy of the maps which have been most extensively circulated is only 67d., which, with 1's6d. for paper and printing, makes the cost per copy 2-232d., or less than 2 4d. If copper plates had been used, not withstanding the smaller cost of engraving, it would probably have been impossible to reduce the cost per copy below 4d., or from that to 5d., because, if twenty thousand impressions had been required, five plates must have been engraved, at an expense of at least 120L, instead of one at the expense of 35L.

In the production of illustrated books, the advantages of steel engraving are strikingly observable, since, by acting upon the principle above stated, many works have been published of late years which could not have been produced with copper-plate engravings, because the number of impressions being so limited, the price of each copy must have been such as to preclude the possibility of a remunerating profit. The circulation of such books, however, has been so great as to render the regular allowance to booksellers, at least seven thousand copies must have been sold to return the cost of production. The volume of poems by the same author, which was published soon afterwards, although issued as an Obtainable price, was still more expensive in its production. (Printing Machine, vol. i., p. 13.) In periodical publications of large circulation the use of copper plates was attended with great expense and inconvenience. The 'Evangelical Magazine,' for example, in order to secure a number of copies greater than twenty thousand copies, was compelled to use four distinct plates, each of which, in many cases, had to be repeatedly retouched by the engraver to make it yield the necessary number. In January, 1823, steel was first adopted for this work; and the number of a small number, which has been the most elaborate engravings were used. Of the portraits engraved on steel for this and another work of similar character, it is not unusual to take the full number now required, about sixteen thousand copies, without any repair being done to the plate.

The recently invented art of multiplying engraved copper-plates by voltaic electricity may possibly have some effect upon the future use of steel engraving; since it affords the means of obtaining numberless impressions without deteriorating the original plate. The introduction of electrotype plates, which would, it is supposed occasion their rapid wear, has been urged as an objection to its use for printing long numbers; but the writer has been assured that ten thousand impressions have been obtained from one electrotype plate, the engraving of which was strong and deep.

STEEL, BIR RICHARD, was born at Dublin in 1671. His father, who was private secretary to James, first Duke of Ormond, and whose family had seats in the house of commons in London; whence Steele was removed to Merion College, Oxford, and admitted a postmaster on that foundation in 1691. He afterwards was an ensign in the Grand, and in 1702 attracted the notice of the public as an author by the publication of an Epistle to the Author of the Four Great Comedies, successfully acted in that year. Two more comedies, 'The Tender Husband,' acted in 1703, and 'The Lying Lover,' 1704, followed this first attempt. In 1709 he commenced 'The Tatler,' the first, in our literature, of a series of periodical works in the form of short essays. He was soon after made one of the commissioners of the Stamps-office. In 1711 he began, in conjunction with Addison, 'The Spectator,' and in 1713 'The Guardian.' In this year he was dismissed from his situation at Hampton Court, and was elected member for Stockbridge in Hampshire. In March of this year he was expelled the House for writing two pamphlets, 'The Englishman' and 'The Crisis,' on the succession to the crown of England, alleged to contain treasonous matters respecting the person of the Prince of Wales. He was supported on this occasion by Addison, and other distinguished members of parliament.

After the accession of George I. in 1715, Steele was made surveyor of the royal stables at Hampton Court, and was knighted on the occasion of an address. The same year he was chosen member for Boroughbridge in Yorkshire, and appointed one of the commissioners of forfeited estates in Scotland. He continued to write articles relative upon the political events of the time, and not infrequently, in his life appears to have suffered much from poverty, caused partly by a habit of speculating in new projects. He sustained a considerable loss—nearly 10,000L, by his own account (see his letter to the duke of Newcastle, Epiat Corn, 485)—by the revocation, in 1719, of the patent by which he

* In the infancy of the art it was usual to charge engraving upon steel double the price demanded for the same work upon copper; and even now the comparative expense of engraving upon steel and copper is, we believe, in most cases, about as three to two,
was constituted governor of the royal company of comedi- ener. In 1722 his comedy of "The Conscious Lovers" was acted. Some time before his death he retired into Wales, to his seat at Llangunnor, near Caermarthen, where he died September 1, 1729. He had been twice married, first, to a lady of Barbadoes, secondly, to Elizabeth, the daughter of Jonathan Sereck of Llan- brech, Glamorgan, by whom he had a daughter, married in 1732 to the Hon. John Trevor, afterwards Baron Trevor of Bromham.

Steere has the merit of having originated a kind of peri- odical which not before knew any value. The scale of the series of works commencing with 'The Tatler,' of which, in conjunction with Addison, he was the author, is needless here to speak. They are remarkable for a style combining with the ease of familiar conversation grammar and harmony of thought and form, for the insight and judgment shown in the choice, and the versatility in the treatment, of the subject, and, above all, for the refined and Horatian satire which, expressing itself in a tone of playful irony, and by means of allegory or personification of character never obtrusively personal, formed the style and reformed the manners of the generation by whom the perusal of these writings was regarded as a passing amuse- ment.

There is a full biography of Steere in Chalmers's 'Biographical Dictionary.' Authority for the principal facts there stated may be found in his Epistolary Correspondence, published from the originals in the British Museum, and illustrated with literary anecdotes, by John Nichols, 2 vols., 1771, and 1774. There is also a Memoir prefixed, in 1791, to the 'Anti-Theatre,' Steere's Case with the Lord Chamberlain, with other of his tracts; and in 1790, 'The Town Talk,' 'Fish Pool,' 'Plebian,' 'Old Whig,' 'Spinner,' &c. &c. &c. 8vo. H. Williams, 1790. 4to.

STEELYARD, in mechanics, a kind of balance or weighing-machine, consisting of a lever of unequal arms. The most common kind of steelyard, which is often called the Roman balance, is a lever of the first order, and is used by suspending the weights to be weighed at the end of the shorter arm, and sliding a determinate weight along the longer arm, to a greater or less distance from the fulcrum, until the instrument remains in equilibrium in a horizontal position; the weight of the substance attached to the short arm of the lever being indicated by observing the position of the moveable balance-weight with respect to a graduated scale marked upon the long arm of the steelyard. In the common steelyard a hook or hooks are usually suspended from the short arm, to hold the article whose weight of which is to be ascertained; but sometimes a scale-plate or dish suspended by chains is added. The moveable weight is commonly attached to a ring, the form of which enables it to rest in notches cut on the upper edge of the steelyard, corresponding to the graduations marked on its side. A ring or hook is also attached to the fulcrum, so that the instrument may be conveniently hung upon a fixed support, or if small, held in the hand; and a vertical index or pointer, similar to that attached to the beam of common scales, is sometimes added. The fulcrum, and the axis from which the weight is suspended, should, when much nicety is required, be provided with knife edges or bearings resembling those used in other lever-balance. Many steelyards are supplied with a second fulcrum; the two being placed at different distances from the point to which the hook or scale is attached, and having their respective pointers and suspending-hooks on opposite sides of the lever, or rather, when held in the position for use, one above and the other below the horizon. In this form, he antient Roman steelyard which is inserted at the end of this article. In using a steelyard of this kind, capable of weighing from one to sixty pounds, the fulcrum which is nearest to the middle is used if the article be under fifteen pounds; while, if it extended beyond, the instrument must be inverted, and suspended from the fulcrum which divides the lever most unequally. Of course when this arrangement is adopted, the shackles, from which the article to be weighed and the moveable weight are suspended, must hang equally well in either position of the lever; and different graduations must be used for each. It scarcely need be observed that, while it is a peculiar character of this kind of balance that the weight used is much lighter than the article to be weighed, it is possible to increase the weight, by placing the moveable weight nearer to the fulcrum than the fulcrum is to the axis from which the article hangs. The degrees of sensibility and stability must be regulated in the same way as in an ordinary equal-arm balance. [Balance, vol. iii., p. 307.]

Various modifications of the steelyard have been con- trived for delicate scientific purposes, or for adapting it to the purposes of weighing very light substances. Impro- vements made by C. Poult of Geneva, about forty years since, rendered this kind of balance capable of weighing with great nicety. They are fully detailed in the third volume of Tilicho's Philosophical Magazine, in a paper translated from the French under the title of 'The second volume of Gregory's 'Mechanics,' under the title 'Steelyard.' M. Paul placed the points of suspension exactly in the same horizontal line as the divisions of the beam; and he balanced the steelyard in such a way that, when the weight of the object to be ascertained is placed, and the index or cock attached to it is perfectly vertical. Hence it became easy to ascertain the accuracy of the steelyard by simply unloading it. Instead of obtaining the power of weighing substances of different nature, by the use of two fulcrums, as above described, he used two different weights, with the same fulcrum and graduated scale; one weight being a multiple of the other; so that, for instance, if the heaviest indicated, when placed against the index, was found to balance the graduated scale, the smaller, placed in the same position, would indicate ten ounces. By using the two weights together, the weight of a very heavy body might be ascertained with great nicety. The steelyard which Paul constructed was capable, it is stated, of indicating an ounce of weight or less. Steelyards contrived in this way are used in the weight-room of the Mint for examining gold-silver and the weight with which it was loaded. Another advantage at- tending the use of two weights of this kind consists in the facility which they afford for testing the accuracy of the balances by examining the same weight in the case of ten pounds. Thus, with a correct steelyard, graduated for avoiding the above objection, the beam, or scale, would be the same whether the larger or pound weight be placed at 1, or the smaller or ounce weight at 16. The general adoption of such a contrivance would obviate the principal objections to the use of the steelyard for the ordinary pur- poses of commerce, the facility which it affords for fraudu- lent deception. Tillich gives a representation of one of M. Paul's steelyard balances, contrived for scientific purposes, in which it was proposed to use different sets of weights with the same engraved scale, to indicate the weight of the object under examination according to various systems of weights. In a steelyard contrived by Mr. Patton, of Rhode Island, United States, for purposes for which much delicacy is required, the weight is attached to a sliding-box, which traverses along the beam by means of a screw. The box passes through the sliding-box, and is secured by bearings at its ends in a position parallel with the beam, and it is turned by a milled head. In a large balance on the principle of this, the weight is attached to a long box or case, which slides along the beam, and is supplied with a thumb-screw, the point of which is made to press against the side of the beam in order to secure the slide at any required point. The large weight attached to this sliding-box indicates, by a scale marking the beam, the larger amounts, as hundreds and quarters; and the smaller, as pounds and ounces, are shown by means of a small weight traversing a scale engraved upon the sliding-box.

Several ingenious bent-lever balances have been contrived, some of which, from the circumstance of the levers being of unequal arms, resemble the steelyard in principle. These, and the steelyard weighing-machines for ascertaining the weight of loaded carriages, are noticed under Weighing- Machine.

The balance known as the Danish or Swedish steelyard differs from that above described in having the weight fixed at one extremity of the lever, while the fulcrum itself is movable.

Though probably not so antient an invention as the equal- arm balance, the steelyard is an instrument of very early origin. Under the name of statera it was well known to the ancient Romans, and was known in the form of a bust, in the second book, chap. 8, of Vitruvius (book x., chap. 8) under the name of 'statera.' It describes the principle on which it acts. Many Roman statera of brass still exist, some of which are very like the steelyards of the present day. One of these, with a double ful- crum, with which a series of notches were bored, is pre- sented in the annexed cut. It appears, by the inscription on the beam, to have been made about the year 77 of our
era. A kind of steelyard is used by the Chinese for weighing very delicate matters, as gems and precious metals. From the manner in which the steelyard is mentioned in a curious tract published in 1278, it would appear that it was not at that time much known in England. The author recommends it for weighing charges for artillery, as being less troublesome than ordinary scales, owing to the use of but one weight, and that of small dimensions, and observes that the instrument was "alotgether use in South Spains to wey all kinds of marchandine," and that it was called 'staryter.' (Bourne's Inventions or Devises, p. 45.)

The portable weighing-machine called the spring or pocket steelyard is noticed under Spring-Balance, vol. xxii., p. 355.

STEELYARD, MERCHANTS OF THE, a body of aliens who enjoyed various commercial privileges in England from an early period to the middle of the sixteenth century. "The emperor's men," mentioned in some ordinances of Ethelred II. (A.D. 978-1016) as trading to England, were the predecessors of the merchants of the Teutonic Gild. In 1229 the merchants of Cologne had a hall or factory in London for the legal possession of which they made an acknowledgment to the king. "It seems that this Gildhall, by the association of the merchants of other cities with those of Cologne, became in time the general factory and residence of all the German merchants in London, and was the same that was afterwards known by the name of the German Gildhall (Gildhalla Teutonicaem)." (Macpherson, Annals of Commerce, i. 383.) In 1235 Henry III. gave them permission to attend fairs in any part of England, and also to buy and sell in London, saving the liberties of the city; and they were exempted from several customs and payments. In the fifteenth century we find the Hanse merchants engrossing the privileges of the above antient incorporation, Cologne being a member of the League, and the whole of the German merchants resident in London probably belonging to one or other of the Hanse towns. At least, after 1475, they had but one factory in London, which was the Steelyard, or Steel-house, as it was sometimes called, situated a little east of Dowgate, between Thames Street and the river. In 1475 Edward IV. entered into a treaty with the Hanseatic League, by which the privileges of the London factory were placed on a more secure foundation, instead of being revoked for a short period, and being at times curtailed and even occasionally suspended. By way of settling former disputes, it was thought worth while to pay them 10,000l., or rather to remit customs' duties on their goods to that amount. The king was to appoint two or more judges to sit with two English judges in London, to hear and determine all legal formalities in all civil and criminal cases between the Hanse merchants and English; and similar regulations were to be adopted in reference to English subjects residing at the Hanse towns. The fee simple of the Steelyard was conveyed by this treaty, also the Steelyard at Bremen and a house at Lynn. Under this treaty and their old charters the Hanse merchants of the Steelyard were enabled to monopolise certain branches of trade, in which they were exempted from paying duties by other traders; and by the combination and capital, they were doubtless formidable competitors in other branches of foreign trade; but though the activity of foreigners might be tolerated while native capital was wanting, yet a trade from which English merchants were virtually excluded could not possibly be permanent. Besides exciting popular indignation, the privileges of the Steelyard merchants were politically inconvenient, for when the direct trade with the Netherlands was stopped in 1493, large quantities of Flemish goods were imported from the Hanse towns into that country. The occasion the journeymen and apprentices of London attacked the warehouses of the obnoxious Germans. In 1505 a rival interest was created, by a charter granted to the Company of Merchant Adventurers for trading in woolen cloth to the Netherlands. The merchants of the Steelyard were bound in heavy penalties not to interfere with the trade of this new incorporation, which soon became a powerful rival not only to the German merchants, but to the merchants of the staple. In 1551 various allegations of the Merchant Adventurers, with the counter-statements of the merchants of the Steelyard, were put into the hands of the solicitor-general and the recorder of London, upon whose report the council came to a resolution that the Steelyard merchants had forfeited their privileges, their charters being contrary to the laws of the realm. The council reported that no particular persons or towns being mentioned in these charters, the corporation had extended their privileges to whomsoever they pleased; that English subjects had not enjoyed reciprocity of privileges in the Hanseatic towns; that their English trade was no longer confined to the Hanse towns; that they had engrossed almost the entire trade carried on by foreigners in the kingdom; lastly, that they had reduced the price of wool, and also of corn by their importations of foreign grain. The articles which they imported, besides grain, are stated to have been cordage and other naval stores, flax and hemp, linen, cloth, and steel. The English Merchant Adventurers had based on the charters of the older incorporation, which however continued to linger until 1597, when the emperor Rudolph having ordered the factories of the English Merchant Adventurers in Germany to be shut up, Queen Elizabeth directed the lord mayor of London to close the house occupied by the merchants of the Steelyard. It is said that in 1554 Queen Mary had restored their privileges, and in a year or two afterwards withdrawn them, but the facts are not very clear on this point. (Hanse Towns; Staple.)

STEEN, JAN, one of the most celebrated painters of the Dutch school, was born at Leyden, in the year 1636. His father was a brewer, who, complying with his son's desire to be a painter, put him apprentice to Nicholas Knupfer, a German artist of considerable note, at that time residing at Utrecht. He afterwards studied under Van Goyen, who was so pleased with his agreeable manners, and his talents as a painter, that he gave him his daughter Margaret in marriage. Though Steen soon acquired great reputation, he did not gain sufficient to live with comfort, because he spent much time on his pictures, which he finished with extraordinary care. His father therefore advised him to start up a brewery at Delft, in which he was every success, but his propensity to an idle, intemperate, and dissolute course of life made him neglect his business, and having incurred debts, he was driven by necessity to his pen. With the assistance of his relations he set up a

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public-house, which was much frequented, but only gave him more opportunity and temptation to indulge in his intemper-ate way of life. The scenes which he saw here he trans-
ferred, often in a state of intoxication, with unrivalled skill to the canvas. None of his able contemporaries surpassed him in the variety of his compositions, nor in the character of his pictures, and in the skilful distribution of light and shade. 'In spirit, humour, and invention,' says Dr. Warson, 'Stein excels all other Dutch painters in the same line; to this is added a fine, light, easy touch, a great freedom of Shaksperian characters, and a more propen-
sity of execution approaching if not to Metten.'
He sometimes attempted historical subjects, such as Moses striking the Rock, but it is in scenes of domestic life, of the higher as well as the lower classes, that he is of greatest value; and he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled in that he alsoexcelled 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by vexing their vanity.' This, most probably, was the true state of the case. Steevens had no domestic ties, and men were afraid of him. Johnson said, on another occasion, in which there is little doubt he alluded to him, 'Sir, he lives in a castle without a castle, and has an ancestor without a name; and to him, his anonymous ridicule, gratified his sense of power. He had higher abilities and more scholarship than many of the sober critics who were then busied about our early literature; for them, it always must be, the small men, who apply their iniquity, and find no laugh in their jests, to great (to use Bentley’s forcible image) when they were on a giant’s shoulders. While Steevens, in his own notes on Shakspeare, is making the most profound bows to this man’s lewdness, it is clear he was almost so beclouded by the mist of his own conceit as it were upon his readers, and whispering, ‘what owls!’ Amongst other tricks, he set up mock commentators, under the names of Amner and Collins, to perpetrate dirty annotations; and he, one signs a bitter attack on Capell, in his own edition, with the name of his friend, rival Malone. George Steevens died at Hampstead, in January, 1800; and was buried at Poplar, where his memory is graced by one of Flaxman’s monuments.

STEFANO (called Florimono) was born at Florence in 1601. Though his most notable works, in the church of Ara Coeli at Rome, Santo Spirito at Florence, and elsewhere, are no more, he deserveth to be mentioned as a disciple of Giotto, and the only one who attempted something before that master—that is to say, anything like the execution of Terzari, excelled in every department of the art. He was Giotto’s grandson, by a daughter named Caterina. He was the first who attempted foreshortening, and if he did not completely succeed in this, he certainly made improvement. His method of executing the variety of character or life to his heads. No authentic testimony of his remains in Tuscany, ‘unless,’ says Fuseli, ‘we except a Madonna, in the Campo Santo of Pisa, undoubtedly in a greater style than the works of his master, but retouched by himself.’

STEFANO, TOMMASO, who is supposed to have been the son and pupil of the preceding, was called Giotto, from the resemblance of his works to those of Giotto. A Pietà, at S. Remigio at Florence, and some frescoes of his at Arezzo and elsewhere are very pleasing, and the whole is a Candidates, 1650, at Castello Franco. In his youth he was entered a chorister at St. Mark’s, Venice, where a German nobleman, pleased with his singing and appearance, obtained his discharge from the church, took him into Bavaria, there bestowed on him a most learned and liberal education, the musical part of it under Eocle Bernabei, and finally, when he had arrived at the proper age, got him ordained, and then sent him to Rome, where he passed a life of study, and is now commonly known. His ecclesiastical compositions soon became numerous, were much admired, spread his fame, and attracted the notice of Ernest, duke of Brunswick, father to George I. of England, and the Elector of Cologne, who, at first his patron, and afterwards his friend and protector, made him director of his chamber music, and committed to him the management of the opera, then just beginning to raise its head in Germany. But the intrigues of singers at length wearied him of his theatrical and rather incongruous occupation, though not till he had composed several operas, which, translated from Italian into German, were performed at Hamburg from the year 1694 to 1700. These however are forgotten; but his madrigals, canzonets, and instrumenal articles, are reckoned among the best known of all his works, and of which it is enough to say, that Handel acknowledged his twelve celebrated duets to have been written in imitation of them.

STEHL, ANTON, a celebrated German statesman. He had a considerable share in concerting, with the courts of Vienna and Ratisbon, the scheme for erecting the duchy of Brunswick-Lüneburg into an electorate, for which service the elector made him his prime minister. Innocent XI. gave him the bishopric of Spiga. In consequence of this he no longer put his name to his compositions, but adopted that of his secretary, Gregorio Pira; and in 1708 relinquished his appointments in Hanover in favour of higher dignities, great Hanbel. He died at Frankfurt, in the year 1729.

STEBBIST, DANIEL, a celebrated composer for, and performer on, the piano-forte, was born at Berlin, in 1765, where his father was a manufacturer of musical instruments. When a youth, attracting the notice of William III. of Prussia, he was educated at the charge of that monarch, and soon distinguished himself. In his travels he visited Paris and London. In the former city he had the honour to introduce Haydn’s Creation, and also published many works. In the latter he made a considerable stay, took many pupils, and produced and printed much piano-forte music. He afterwards returned to his native country, and in 1791 was appointed master of music to the king, with which the term sparkling may be applied. His best compositions are remarkable for brilliancy, and what we will venture to call picturesque effect, and his execution of them was singularly delicate, animated, and beautiful. He composed also some operas which were performed in Paris and in St. Petersburgh, but these did not survive their author.

STELLA‘RIA (from stella, a star), the name of a genus of plants belonging to the natural order Caryophyllaceae, and the section Alarum. The calyx has 5 sepals; the corolla is composed of 5 petals, which are either bilb or bippitate; the stamens are 10 in number; the ovary simple, with indefinite ovaries; styles 3, and the fruit a capsule with six valves. There are 67 species of this genus enumerated. Most of them are herbs, but some are shrubs and are distributed over the world. Eight of them are found in Great Britain. In common with the whole order to which they belong, they possess no active properties. Few of them are thought worthy of cultivation, and when planted in gardens they require but little care.

S. Holostea, the greater Stitchwort, is a British species, and is the handsomest plant of the genus. It has a nearly erect stem; lanceolate, acuminate, finely serrated leaves; inversely heart-shaped bilb petals, twice as long as the calyx. It is often planted in gardens as a border flower, for which, on account of its early delicate white flowers, it is well adapted.

S. medica of the common chickweed, which is so common and abundant on road-sides and waste places all over Europe, is characterised by its procumbent stems possessing an alternate line of hairs between each pair of leaves. It has small white flowers, which are open almost all the year. It is frequently eaten as a pot-herb, and small birds are very fond of its seeds.

S. cerasitides, and scopigeria, the Alpine and many-stalked stitchworts, are both of them British plants, and are sometimes cultivated in pots.

STELLATTA, PAOLO, found a natural order of plants formed by Ray. The verticillate arrangement of the leaves of the plants of this order gives them a starlike appearance, whence the name. The order is called by Lindley Gallaceae. [Gallaceae.]

STELLENBOSCH. [CAPE OF GOOD HOPE.]

STELLER’S, Cuvier’s name for a genus of Herbitoribus Capitae, Syriana of Illiger. [Whales.]

STELLIO, Cuvier’s name for a genus of Icuanians, under which he arranges the following subgenera—Cyrtodus, Stello, Dorycephurus, Orectix, Agama, Trapelus, Leopoldius, Tropidolepis, Leposaema, Spix (Tropidossauros, Boie), Calotes, Lophurus, Goncocephalus, Lycocephalus, Brachyphas, and Physisphalus. [Agama; reptiles; saurians.]

STELLIONATE, a word derived from stelio, the name of an animal of the lizard kind, mentioned by Pliny (Hist. Nat. 1, 3, c. 10), and by Virgil (4 Georg. 2453), is a term used in the Roman law to denote all whom a particular or an honourable name or title is given to, which name or title is an improper or special name to distinguish them, and are not defined by any written law. In general, wherever a civil action might be brought on the ground of fraud, there might be a criminal prosecution for
stellionate. The term however is chiefly applied to cases where a person sells, exchanges, or transfers to one, property with respect to which he has already entered into a contract with another. It is also applied to cases of pledg ing or of property, but developed so far in the metals, dealing in counterfeit or adulterated goods, and generally to the practice of any species of imposture. The punishment of stellionate was of necessity discretionary. Where the criminal was a person of distinction, the ordinary punishment might have been that of banishment and degradation from his rank; and where he belonged to the lower orders, it seems to have been competent to inflict any punishment short of condemnation to work in the mines. (Dig., tit. 29; Hoffell, Justepr. For., s. 2085.)

**STELLIRIDIAN.** M. de Blainville gives the third order of his *Actinidea*, comprehending those radiated animals which are commonly known as *Star-fishes*, or *Sea-Stars*, and may be arranged under the great genus *Asterias* of Linnaeus.

The following is M. de Blainville’s definition of the order:

**Body generally depressed, wide, and regularly formed, at its circumference, into angles which are more or less sharp, often prolonged into lobes or rays perfectly similar, covered with a skin more or less sustained by calcareous pieces.**

**Emissary Canal** provided with a single buccal orifice, unarmed, but surrounded by tentacularium suckers.

**Ovaries** radiated and opening at the margin of the mouth.

M. de Blainville remarks that this extremely narrow order corresponds almost exactly to the genus *Asterias* of Linnaeus; but it has become necessary to add to it the *Evechinus*, which the latter author had arranged as species of *Isis*, or *Pemataula*.

The character of the order, according to M. de Blainville, rests—

1. On the nature of the skin, which is more or less flexible, although solidified by very diversiforme, calcareous pieces, and which present, at the buccal surface, a sort of very regular disposition serving for locomotion.

2. On the absence of the anus from the intestinal canal, which last is no more than a stomach more or less lobated at its circumference.*

3. On the constant termination of the ovaries, disposed in rays, at the circumference of the mouth.

As to the form of the body, M. de Blainville admits that it is often very different, although it is always at least regularly polygonal; in fact, he adds, these angles, which are sometimes very acute, can be developed so that in the family of the *Ophiura* and *Comatula* they become true appendages in the form of long rays, sometimes even divided or dichotomized. This disposition has led to the comparison of these animals with stars.

*Ovaries* radiated. Very wide. Few or no seas are without some species of the order.

**Organisation.**

**Digestive System.** The nutritive apparatus of the Steli ridi ans is very simple; presenting in most of the family a single orifice destitute of teeth in the centre of the lower surface of the body, performing the functions both of the mouth and the anus; but in some presenting a digestive cavity with a series of evacuation distinct from that by which the food is taken in. In the catalogue of the Physiological series in the museum of the Royal College of Surgeons in London, there are examples of both these modifications.

The digestive of the first section, consisting of those starfishes which have the digestive cavity simple, or without distinction of stomach and intestine, receiving and expelling its contents by the same orifice, we find No. 432, a preparation of *Asterias papposa*, Linna. Stelliam. *Astarte caecis*, Link; *Asterias papposa*, Agassiz; and *Solaris papposa*, Forbes. It exhibits the central orifice of the digestive cavity, and a portion of the intestine which has been reflected on the opposite side of the body, to show the numerous canals continued from the digestive cavity. No. 433 presents a vertical section of the same species, showing the interior of the same cavity. In No. 444 the integument has been removed from the whole of the anterior part of the body of an *Asterias rubens*, Linna. (*Asterias glauca* and *Asterias cincta* of the same, Forbes,) showing the membranous digestive cavity, containing some small bivalves. No. 433 is a specimen of *Asterias discoides*, Lam., from which two rays have been removed, showing the singular and beauti fully developed constitution of the membranous pouches. These membranous pouches appear to be given off in two series, are acculated, and strong, as it were, upon a mesentery.

The second modification is shown in No. 433 A., which presents *Asterias rubens* (Leach). The alimentary canal is continuous in its passage from the central orifice or mouth, and terminated by a second direct orifice or anus, situated at the extremity of a fleshy tube, which projects forwards by the side of the mouth. M. de Blainville states that the lines in this and rather considerable in the star-fishes; it occupies the circumference of the stomach, forming bunches or racemes (des espèces de grappages), which are prolonged more or less into the cavity of the appendages when there are any; at least, he observes, may or may not be formed, and it is by Spix and Meeck, Delle Chiaje, on the contrary, regards these organs as a kind of stomachal cecum (and such an opinion seems to be strengthened by the preparations above noticed), and thinks that the liver is an irregular organ, which is made to suit the superior passage of the food of another, which no other author, according to M. de Blainville, makes mention, and which he himself had not observed. This organ is a racemose little bag of a yellowish-green or yellow flou. It may present a similarity to bile both to the sight and taste.

**Food.**—The very dilatable mouth and gullet of the starfishes is admirably adapted for securing the testaceous mollusks and other animal substances on which the family fed. When the prey is apparently disproportioned to parts into which it is to be conveyed, the esophagus or gullet, together with part of the stomach itself, can be protruded and everted so as to draw the desired food into the cavity by the application of the everted surface to it. Thus, the star-fish is able to swallow whole or the part. living have been taken from the cavity. At other times the juices of the prey are sucked out, and the exhausted bivalve is left dead with its shell gaping. Not that the old supposition that the star-fish succeeded, in this last mode of feeding, by inserting, say, or finger into its long shell, and, if it found the bivalve too strong for it, got rid of the difficulty and the ray at once, conscious of its power of reproducing another, seems to be at all founded in fact. Star-fishes are generally supposed to devour other starfishes, to break up the bivalve shells, and thus leave the mollusk torpid and deprived of the power of closing its valves against the attacks of its destroyer. Star-fishes are considered, and not without reason, as great enemies to star-beds. [Asterias, vol. ii, p. 515.] But it is not on living prey alone that the star-fishes feed. They seem to assist materially in cleansing the sea from dead and decomposing animal matter. A human tooth has been found in the stomach of a star-fish.

**Respiration.**—Although there does not appear to be any special organ for respiration in the Stelliridi ans, the oxygenization of the circulating fluid is extensively provided for by the exposure of the peritoneal cavity, and all the viscera, to the sea-water, which is freely admitted through a small aperture within the walls of the animal, and are lined in the inside a shallow pit perforated with holes, through which the tubes communicate with the internal cavity. The tubes pass through the collar of the animal, which is lined, and are lined in the inside by a prolongation of the peritoneal membrane. This membrane lines the parieties of the body, and is reflected over the contained parts; at least it
covers the stomach and ceca, and probably also the ovaries and vessels of the foot; opposite the perforated pits it sends prolongations through the holes into the tube, as may be easily seen in stripping off a portion of it. There can be no doubt that sea-water enters the peritoneal cavity. The animal slowly distends itself with fluid, and again, but at no stated interval, gives out a portion of it. This is obvious from the fact that any one animal may be seen during a day surrounded by two or three smaller ones flaccid at one extremity. Naturalists are generally of opinion that the water enters and issues by the respiratory tubes, and indeed no other orifices have been discovered; we must however freely own that we have never been able to observe any indication of its passage through these tubes. The peritoneal membrane seems to be the principal seat of respiration; spread over the viscera and the parietes of their containing cavity, and lining the respiratory tubes, it presents a great extent of surface continually in contact with the surrounding medium; and we have found that a beautiful provision exists for maintaining currents of water along the membrane, and thus effecting that constant renovation of the fluid in contact with its surface, which is required in the respiratory process. These currents are produced by means of cilia. Ciliary currents take place also on the external surface of the body, which probably partake in the process of respiration; we have moreover observed them within the tubular feet, and on the interior surface of each caeca. Yet, although in the event of the body in a state of disintegrate the whole situation they are probably subservient to digestion. (Cyclopedia of Anatomy and Physiology.)

Circular System.—Tiedemann and Delle Chiave are the authorities from whom a knowledge of the circulating system is derived. M. Tiedeman, in fact, gives the new system of animals, which he supposes to be the digestive and contractile organs and vessels, and has consequently supposed that the ducts which convey the fluid supplied to the feet, afford nutrition to other parts of the body. In other words, he recognises two distinct systems of vascular communication, the visceral and the alimentary, connected by vessels which carry blood, and the other a set of vessels (those of the feet) conveying a nutritious fluid secreted from the blood.

Delle Chiave contends that the two orders of vessels above alluded to intercommunicate, and so form but one system.

Dr. Sharpkey is disposed to conclude, from his own observations, that the vessels of the feet form a system apart from the blood-vessels, as Tiedemann maintained; but he at the same time states his belief that the vessel which conveys to the stomach, as that author supposes, they serve as the nutritive vessels of the parts in which they run; for, according to Tiedemann's description, it does not appear that they ramify in the stomach, and form the form of the stomach, the vessel does not present the usual characters of blood, or of a fluid adapted to nourish the textures. He admits it to be true that there are floating particles suspended in it, but he states that the clear fluid, when filtered, yields no trace of animal matter, but agrees almost entirely in composition with sea-water. Such, at least, was the result of Dr. Sharpkey's examination of it in the Asterias; and he proceeds to give an account of the proper sanguiferous system, following Tiedemann as his leading authority, but, at the same time, stating the more material points in which Chievo differs from him, thus—

"In Asterias, a delicate vessel runs along the upper surface of each of the ceca. There are of course ten such vessels in Asterias aurantium (from which the description is taken), corresponding in number with the ceca. They commence near the extremity of the rays, and, receiving branches from the branches and lobes of the ceca, proceed to the central part of the animal, where they terminate in a circular ring, forming the material points in which Chiave differs from him, thus—

The preparation No. 1292 A, in the series illustrative of the nervous system of the Ctenophora, presented, to a considerable degree, the membrane removed from the oral surface of the central disk, to show the simple nervous chord surrounding the mouth and distributing filaments to each ray. These filaments run in the interspace of the tubular feet, and by running from the body of the animal to the alimentary organ. The circular vein opens into a ventral canal, which descends along the prominent angle between the two rays, inclosed in the same membranous
into which the heat opens, and of filaments passing and diverging from the annular chord opposite to the rays—three filaments for each one running along the under surface in the median line, and appearing to send small branches to the feet; the other two, shorter, passing between the first and second segment of the ray into the interior of the body, and probably distributed over the under surface. No ganglia were discovered by Tiedemann, but minute ganglia have been described by others as existing at the points whence the diverging filaments spring. (Grunt's Comp. Ann.)

All of course agree in assigning the sense of touch to the star-fishes, but many would confine their endowment to that sense. Professor Ehrenberg however, who is a keen and accurate observer, is disposed to think that some of them, at least, have a general organ capable of conveying a general sense of touch, as being regarded as particularly the seat of sensation, or perception. But this inference is not merely deducible from an inspection of the anatomical character of the nerves: it is based upon actual experiment. We have frequently, when examining these animals in a living state—that is, when, with their feet fully developed, they were crawling upon the sides of the vessel in which they were confined—cut off with scissors successively portions of the body so as to expose the viscerum. We have found far from this appearing to be conscious of the mutilation, but the slightest evidence of suffering was visible: the suckers placed immediately beneath the injured part were invariably retracted; but all the rest, even in the same ray, still continued their action, as though purposely devoid of participation in any suffering caused by the injury inflicted. Such quality would indeed seem to be a necessary consequence resulting from the deficiency of any central seat of perception whereunto sensations could be communicated; nevertheless these animals in a living state—that is, when, with their feet fully developed, they were crawling upon the sides of the vessel in which they were confined—cut off with scissors successively portions of the body so as to expose the viscerum. 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The general sense of touch in the Asteridae is extremely delicate, serving not only to enable them to seize and secure prey, but to recognize its presence at some little distance, and thus direct these animals to their food. A person who has been in the habit of fishing with a line in the shallows, and has noted with stored and observed as frequently a bait is taken and devoured by them, will be disposed to admit this; yet to what are we to attribute this power of perceiving external objects? It would seem most probable due to some modification of the general sensibility of the body, allowing the sense of perception to be affected in some degree allied to the sense of smell in higher animals, and related in character to the kind of sensation by which we have already seen the Actiniae and other polyps able to appreciate the presence of light, although absolutely devoid of any tubular portion placed within the body, and a tubular part on the side, projecting from the surface, and continues with the foot through an aperture in the skin or shell. The tube is closed at the extremity, and terminates there in a sucker, which has usually the form of a disk slightly depressed in the middle, and by which it is incumbent upon the fibres of the tubular portion being disposed in a circular and longitudinal layer; the cavity is lined with a transparent membrane, and the tubular part moreover receives an external coving from the epidermis. The foot is extended by contraction, the fluid is forced through the tube; or when a tube is wanting, by the projection of a fluid into the tube from a communicating vesel. The tubular part is thus distended and elongated it retracts itself of course by its muscular fibres; and when this takes place the fluid is forced through the tubular portion. In progression the animal extends a few of its feet in the direction in which it desires to go, attaches the suckers to rocks, stones, or other fixed objects, and by such support advances. He who draws its body in the wished-for direction. In the starfish the foot are disposed in rows along the under surface of the
rays, diminishing in size as they approach the extremity. There are usually two simple rows in each eye, and the vesicular part is for the most part deeply cleft into two Johanso in Astereor capax. In other cases, as Astereor rubens, there are rows in every foot with a round undivided vesicle. The canals or vesicles which convey the fluid to and from the feet are all connected with a circular vessel situated in the vicinities of the mouth. This vessel, which is described as connecting the rays at the commencement; from it a straight canal proceeds along the floor of each ray in the median line, and in its progress gives off lateral branches, which open into the vesicles of the foot. There are in addition, to the series of rays of the same kind, a certain number of bodies (ten in five-rayed species), which Tiedemann compares to glands; they are very small, brown, sequestered organs, each opening by a small orifice into the circular vessel. Tiedemann suppresses them to the source from which the fluid filling the feet is derived. Secondly, a circular vessel is described in A. aurantiaca there are four groups of these; and each group consists of three or four sacs, which open by a common tubular pedicle into the circular vessel. In some other species there are five simple sacs. They are muscular, and Tiedemann conceives them to be the chief agents by which the fluid is forced into the vesicles of the feet, to which they are placed in a sort of antagonism. It would be complex, or articulation of the manner of filling the tube in the different species, for by, or according to Mecckel's statement, and, and we may add, our own observation, they are not present in all species. Lastly, the circular vessel receives the singular organ named the stone-canal or sand-canal by Tiedemann, which is composed of four very fine pores, in a mass of sandy or earthy matter, which commences by a wide origin on the external or internal surface of the calcareous disk already described as situated on the upper part of the body, descending in a duplexity of fibrous membrane, and opening by a narrow orifice into the vesicle of the foot, or on the surface of the body, near the point of external origin. Ehrenberg has correctly remarked that this organ is not filled with an amorphous mass of sandy or earthy matter: he describes it as a single tube perforated by a series of circular arches, which have a horizontal or wide end being closed by the disk. Ehrenberg has corrected the view already held, that this organ is filled with an amorphous mass of a more or less irritable, and perhaps hexagonal and pentagonal musculature, resembling, in some respects, the ctenobothrons of the genus of the penis. The result of our own examination, in more than one species, is different still. We have always found the earthy matter forming a juxta-calcareous tube. This tube, which is about the thickness of a surgeon's probe, is composed of rings of calcareous substance connected by membrane, so that viewed externally it is not unlike the windpipe of a small animal. On cutting it across, on the membrane of the membrane, or on the surface which appears externally; for it contains within two convoluted laminae of the same nature as its calcareous parietes. These laminae are rolled longitudinally: they rise conjointly, or as one, from the internal surface of the tube, have a similar direction, and are disposed in opposite directions, somewhat after the same manner as the inferior tubular bone of the ox. These internal laminae become more convoluted towards the upper part, where at last they, as well as the more external part of the tube, join the dorsal disk, appearing gradually to become continuous with its substance. The disk is perforated with numerous pores, which open into the tube. Tiedemann conceives the function of the sand-canal to be that of secreting the calcareous substance by similar stalks to the skeleton. Mecckel considered this view as very improbable, and the description we have given does not tend to corroborate it. We mustconfess ourselves unable to offer more than mere conjecture as to the use of this singular structure. If the fluid contained in the feet and their vessels be sea-water (either pure, or with an admixture of organic particles), which is probable from its chemical composition, may it not be introduced, and perhaps again discharged, through the required end of the calcareous tube, as the porous disk serving as a sort of filter to exclude impurities? (Cyclopedia of Anat. and Physiol.)

General System. - The generation of the Steleliridion appears to be numerous, of that nature which Professors Boscovich and Huxley have described. They are, as far as we are aware, the only organs relating to the generative functions hitherto discovered; but Fabricius, in his Fauna Borealhia, would seem to affirm that two individuals are necessary for the propagation of the species, and that the ootheca takes place in the month of May — "congruidor orbis ovisques compressus, alta supina." The ovaries, which appear to vary in number in different species, form, in general, an oblong cluster of tubes branching from a single stem, by a series of regular or irregular and transverse dilated vessels. In some species, the Astereor rantiaca, for instance, the tubes form numerous bundles (about 20), each of which is distinctly attached, so that they are not all connected by a single stem. In the museum of the College of Surgeons, London, No. 2237 is described as a star-fish (Astereor rubens, Lam.) prepared to show the ovaries, ten in number, attached on each side of the base of each ray, near the angle of divergence; the ova are not developed in this specimen. No. 2237 exhibits an Astereor sparsis, Lam., with four rays, and another part of the posterior parietes of another ray, dissected off, showing the ovaries with the ova at the commencement of their development. The ovaries are two in number in each ray, and in the preceding species, and are similarly attached on each side of the base of the ray, where they may be distinguished from the digestive and locomotive canals by their greater opacity and granular structure. No. 2238 is the same species with the posterior parietes of the central disk removed, showing the commencement of the digestive canals and the ovaries. No. 2239 is a portion of one of the rays of Comatul Du stors, Lam., showing the ovarian receptacles occupying the inner side of each of the rays, and the ova sent off from the rays. Three of the receptacles are laid open to expose the contained ova. (Catalogue, Physiol. Series.)

M. Sars states that the young of Astereor Sarnigulosa immediately after birth have a depressed and rounded body, the attabased, or situated at the anterior extremity, as above stated. When they are a little more developed, papilla disposed in five radiating rows on the upper surface may be distinguished. At the apertures of two or three rays of the body, which up to that time had been rounded, become elongated; and at the conclusion of eight days more, the two ranges of feet or tentacula are developed under each ray, and assist in the locomotion of the animal by alternate elongation and contraction of the whole body. (Skelelon and Dermal Envelopes.) The integuments of a starfish are 1, a leather-like tough membrane in which portions of calcareous matter, which may be termed the skeleton of the animal, are imbedded; 2, an external membrane of a softer texture; 3, certain appendages. The calcears, pieces,' writes Dr. Sharpes, loc. cit., form in a ring round the mouth and a series of transverse segments placed in succession along the floor of each ray. The rings are of these segments is connected with the ring; the decrease in size as we approach the point of division of the ray, and openings are left between them for the passage of the feet. In the Astereor rubens, which has five rays, the central ring consists of ten larger and five smaller pores, the latter formed by the fusion of the rays of the last, the latter corresponding to the angles between the rays. The segments of the rays are symmetrical: in the species mentioned they consist of two oblong pieces united, or the median line, and two smaller ones placed laterally. On the sides of the ray the calcearsubstance is disposed, as it were, in ribs; these rise from the floor at first nearly parallel with each other, and are connected by cross bars, but on approaching the upper part or roof of the ray they approach each other and are finally united in the middle of the rays, the latter corresponding to the angles between the rays. The segments of the rays are symmetrical: in the species mentioned they consist of two oblong pieces united, or the median line, and two smaller ones placed laterally. On the sides of the ray the calcearsubstance is disposed, as it were, in ribs; these rise from the floor at first nearly parallel with each other, and are connected by cross bars, but on approaching the upper part or roof of the ray they approach each other and are finally united in the middle of the rays, the latter corresponding to the angles between the rays. The segments of the rays are symmetrical: in the species mentioned they consist of two oblong pieces united, or the median line, and two smaller ones placed laterally. On the sides of the ray the calcearsubstance is disposed, as it were, in ribs; these rise from the floor at first nearly parallel with each other, and are connected by cross bars, but on approaching the upper part or roof of the ray they approach each other and are finally united in the middle of the rays, the latter corresponding to the angles between the rays. The segments of the rays are symmetrical: in the species mentioned they consist of two oblong pieces united, or the median line, and two smaller ones placed laterally. On the sides of the ray the calcearsubstance is disposed, as it were, in ribs; these rise from the floor at first nearly parallel with each other, and are connected by cross bars, but on approaching the upper part or roof of the ray they approach each other and are finally united in the middle of the rays, the latter corresponding to the angles between the rays. The segments of the rays are symmetrical: in the species mentioned they consist of two oblong pieces united, or the median line, and two smaller ones placed laterally. On the sides of the ray the calcearsubstance is disposed, as it were, in ribs; these rise from the floor at first nearly parallel with each other, and are connected by cross bars, but on approaching the upper part or roof of the ray they approach each other and are finally united in the middle of the rays, the latter corresponding to the angles between the rays.
of the body-are of three kinds. First, calcareous spines; these are found over the whole surface, except the grooves for the attachment of the tube-joint and the two halves to the calcareous pieces of the skin, and are invested by the external soft membrane nearly as far as their point. Those on the upper surface are solitary, short, and for the most part club-shaped, their broader summit being marked with a, nodule where they are formed, and hence the name stellariform. On the right side of the groove for the feet, the spines are thickly set; these in Asterias rubens, have three rows, in the middle and innermost of which they are a little more frequent than in the other parts of the surface they are also longer and pointed. The spines are generally moved by the will of the animal. The appendages of the second kind are of a very singular nature; they have the appearance of pincers of crab's claws in miniature, and were described by Muller as being the limbs of animals under the name of Pedicelaria. Monro gave the name of antennae to analogous organs which are found on the sea-urchin. They do not exist in all species, for Tiedemann makes no mention of them in his description of A. marianicus. In A. rubens they cover the surface generally, and form dense groups round the spines. Each consists of a soft stem, bearing on its summit, or (when branched) at the point of each branch, a sort of forcepts of calcareous matter not unlike a crab's claw, with two broad flat lobes and a pointed tip. When the point of a fine needle is introduced between the blades, which are for the most part open in a fresh and vigorous specimen, they instantly close and grasp it with considerable force. The particular use of these prehensile organs, however, is obscure; their structure is remarkable, and quite impervious. The third sort of appendage consists of those which are named the respiratory tubes. In the other Stellirisians the same general construction of the skeleton may be observed, but the modifications differ with the forms. In some it consists of hundreds of pieces disposed in various patterns, and fitting with the most minute accuracy. In some these pieces are soldered together, as in the caleareous central purse from which the arms of the Ophiura radiate; and in others they are united by ligaments, as in the rays of these Ophiura, the Gorgonomorphis, and the Encrinites. Voluntary dismemberment; and restoration of lost or injured parts.—The sudden and voluntary act of dismemberment by which many of the Stellirisians will save their central disk at the expense of their rays or arms must have struck those who have observed these animals in their native seas, as well as the length of time during which the severed parts still continue to be endowed with motion. This power of regeneration is perhaps at its greatest in Ophiocoma and Latitias, and we refer our readers to Mr. Forbes's account of the voluntary breaking up of these genera, especially the latter, in his highly interesting History of British Star-fishes, &c. above alluded to.

With regard to the power of reproduction, few collectors have not come into possession of a specimen with a budding or growing ray occupying the place of a lost one. Such a case is figured in the article Encrinites, vol. ix., p. 390. Jussieu, Gueydon, and Gerard de Villars brought to Remur specimens of star-fish with four large rays and a small one still growing; they found others, he tells us, with only three large rays and two very small ones; and others with two large rays and three very small, and, as it seemed, very young ones. More than once they met with a large ray, from which four young rays had begun to sprout. Remur speaks of the fact as being well known to the fishermen, and in allusion to certain experiments which Jussieu had been carrying on, he remarks that the portions into which they had divided the animals appeared to go on well, the wounds healed and consolidated; but he adds, that those who made the experiment were obliged to limit their stay on the coast to about fifteen days; too long a period, he observes, to trace the progress of a reproduction which apparently requires several months, or perhaps even more than a year for its completion.

Systematical Arrangement.

Class 2. Pentactinolidos (Quinquafid star-fishes).
Genera, Pentagonyaster, Pentaceras, Astrophyton, Fulmipes, Stella, coriacea, Sol marinus, Pentadicylaster.

Class 3. Polyactinolidos (Multifid star-fishes).
Genera, Hexactis, Hepactis, Octactis, Emneactis, Dodeactis, Dodecadiscus, Tritessokleon.

Section II.

De Stellis Integris.

Class 1. Stellarium vermiciformum.

Genera, Stellaria Lawsia, Tirraneoides.

Class 2. Stellarium cirriformum.

Genera, Deucanemos, Trirractidacanemos, Caput Medusa.

Class 3. Astrophyton.

Genera, Arachnoideis, Astrophyton cotonarium, Astrophyton neptunia, Limumnus.

Limumnus divided his genus Asterias into the following sections:

1. Integra.
Example, Asterias Lanza, the only species.

2. Stellatar.

This section contained nine species. Example, Asterias papora.

3. Radiata.


Position of the genus between Medusa and Echinus. Gmelin arranged the genus in three sections also, retaining the names of Limumnus for the two last; but altering the name of the first, under which he includes four species, to Lunata.

Position of the genus between Phusophora and Echinus. Lamarck, who, according to M. de Blainville, 'a suivi a peu pres les organes de l'astruche,' arranged them as the first section or family of the Echinodermatous Radiata, and separated them into the genera Comatula, Euryal, Ophiura, and Astarias.

The number of recent species of Comatula (Acrila, Licech; Anidolos, Frem.) recorded in the last edition of Lamarck is . The number of these Agassiz separates Comatula multiradiata for the type of his genus Comata. The same author considers the Gymmeda of Gray to be the isolated disk of some species of Comatula.

We must here notice Holopus, a new genus of the Cranioide family [Encrinites] characterised by M. d'Orbigny from the stony skeleton (squelette pierreux) of a species described under the name of Brachiocera, which was brought home by M. Rang, and named by M. d'Orbigny Holopus Rangii.

Generic Character.—Animal fixed to the ground by a root taking the form of the solid bodies upon which it attaches itself. From this root or base springs a foot or body, which is divided into a lateral and a horizontal system of calcareous, solid, convex, convex, convex, and with the same time the functions of an anus placed in the bottom of a irregular cavity formed by the reunion of dichotomous, with the entire, and two, and, divided into numerous articulations, and furnished alternately along their length with small conical ramiules, which are strongly compressed, (D'Orb.)

Upon this M. Dujardin remarks that the author, having seen no more than the stony skeleton, has been only able to conjecture the position and structure of the viscera; and that analogy would lead to the supposition that there is a distinct anus, as in Comata. The individual described was about three inches (French) in height.

The genus Euryale (Astrophyton, Link; Gorgonomorphis, Lich; Ophiura, vol. XV., p. 450) consists of six species, from which Agassiz separates such species as Euryale palmifera (Ophiura, loc. cit.) under the generic name of Tricaster.

Ophiura is divided by Lamark into two distinct sections: 1st, Those species which have the rays rounded or convex on the back. 2nd, Those species which have the rays flattened on the back, i.e. above as well as below. Then again, according to the writers, the flattened character of the rays employed by Lamark.

Agassiz divides the Ophiura into five sections:
Those were,
SteUaria, be
2, the Platycrinites
Acroura
Lamarck's
Ast,
madreporiform
Asterina
pinniped#
speak,
Poteriocrinites
Marsu-
Stelhnia
1.
Encrinites
See
N.
•
2. Encrinus
Palmipes
—
Species
those which are divided into a greater number of rays than five or six. [SOLASTERIES]
Example,
Asterias
venosus; Ast. endeca; Ast. pap-
poas.
Genera,
Ophiura,
Euryale.

A. Species whose rays divide and dichotomize from the base.
Example, Euryale scutata. [OPHIURA.]

III. Asterocrinidians.

1. Free Asterocrinidians. [Example, COMATULA.]

2. Fixed Asterocrinidians.
Genera, Encrinus; Phyocrinus; Pentacrinus; Aco-
crinites; Podocrinites; Agathocrinites; Acacinornites;
Echinotherecrinites; Platerocrinites; Cassidocrinites;
Marsupi-
Pentremites. [Echinochoerites.]
Agassiz also divides the Stellirideans into three families or
principal sections, but he gives them different names.
1st. Asterolarians, consisting of those species which have
for their digestive organs a single orifice surrounded by suckers,
but deprived of teeth; a madreporiform tubercle on the
back between the two posterior rays, and deep furrows
occupied by many rows of pedicels, going from the mouth
to the extremity of the arms.
2nd. Ophurians, those whose body forms a
flattened + and distinct disk, to which are annexed more or
less elongated, or even ramified rays, deprived of furrows on
their lower surface.
3rd. The Ophiuroidea, having two separate, but closely
approached orifices to the intestinal canal; and being for
the most part fixed by the dorsal surface, by means of an
articulated pedicle.

Before we enumerate the genera into which this zoologist
divides Asterias, we must notice the division of M. Nardo,
who had previously proposed the following:—Stellaria
(Ast. aranica—Ast. calcitrana); Stellonia (Ast. rubens
—Ast. glans); Asterina (Ast. exigua—Ast. minuta);
Ameropoda (Ast. memorabilis—Ast. rosacea); Linnia
(Ast. livicirata—Ast. varioleos.)
The following is the division of Agassiz:
1. Asterias (Astropecten, Link; Crenaster, Lihuyid;
Pentaster, Bl.; Stellaria, Nardo).
2. Crenaster, Ag, differing from the foregoing in having
the interior cavity circumscibed by plates disposed like
those of the Echini, at the summit of which may be per-
ceived a star with ambulacra. A genus approaching the

A young Comatula.† See note in opposite column.
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Culindians in its organization, whilst its general form is that of the true star-fishes. Example, only one species, and that fossil, C. Coulouni, Ag.

3. Gonaster, Ag. (Scutaster or Plaster, Bl.)
   Examples, Ast. isostellata, Lam.—Ast. equestria, Linn.

4. Odontaster, Ag. Example, Ast. odontodes, Lam.

5. Linkia, Nardo. Example, Ast. variolata, Lam.


9. Odontaster, Ag. (Scutaster, Bl.) Example, Ast. discors.

Mr. G. R. Gray makes the Hypostomata the second class of the first section (Echinodermata) of his subkingdom Centrotine.

The Hypostomata consist of two orders:—1. Asteroidea; 2. Ophiuroidea.

1. Asteroidea.

Fam. 1. Astereidae. Genera, Astereas; Helaster; Fonta.

Fam. 2. Astropctenidae. Genera, Naucria, Astropycten; Ludia; Pentaster; Solaster; Polyaster; Henricia.

Fam. 3. Pentaceridea. Genera, Cucelia; Pentaceros; Stellaria; Hippaster; Callaster; Gonaster; Echinaster; Gymasteria; Dactylaster; Stellaria; Ophioelas; Linchia.

Fam. 4. Asterinidae. Genera, Palimpsest, Asterina.

Fam. 1. Ophiuroidea. Genera, Ophiura; Ophiurea; Ophiocoma; Ophiura; Rosula; Aplaster; Ophiurella; Amoura.

Fam. 2. Eurydoidae. Genera, Astrophyton; Euryale; Nofilia; Larysta.

The third class is named Blastasteroid, and consists of one family—Pentamereidae, comprising the genera Pentamerites and Orbitremites.

The fourth class is named Stephanoidea, and comprises the genera Stephanites, Hemicosmeta, and Cryptocrinus.

The fifth class, Crinoidida, is divided into the following families:


3. Cyathocrinidae. Genera, Cyathochirinae; Marsupiata.


In the same year, Müller of Berlin read his paper on the genera of star-fishes to the Berlin Academy, in which the anus or anal pore is employed as characteristic of family distinction. This aperture is described as present in all star-fishes, excepting Asterias proper and Hemicheilaster, and thus Mr. Forbes, in his paper which was published in his previously established Ludia. "His genus Crossaster also," says Mr. Forbes, "is my Solaster, published a year before. Several generic names, previously adopted by Agassiz and Nardo, are wanting changed; thus Ureaster is turned into Asteroeuchias, and Pulmuls into Astereus, with which he unites Asterina. In this paper Müller maintains that one of the five intermediate inferior plates of the Ophiura bears a madreporous tube-like, or rather corresponds to the body, a view which I am not inclined to adopt."

With regard to Solaster, we have seen how long ago Solasteria was used by De Blainville; but the practice of wantonly changing names is productive of so much confusion that it cannot become too strongly reproved. Mr. Forbes, in his previous work, has been perfectly justified in his treatment, as the character in the genus Asteroidea is excellently drawn up, and no difference of opinion can exist as to the great general value of the modification.

Of Mr. Gray's arrangement Mr. Forbes says, "The other memoir to which I must allude is one by Mr. Gray on the star-fishes, which he calls the class Hypostoma, and defines some species and genera published under the name Asteroidea with my two first numbers," in the Annals of Natural History. I am afraid I must censure Mr. Gray for changing names still more than Müller, and with less reason. It is a pity zoologists do not take a lesson from their fellow-labourers in the field of nature, the botanists, in this respect. Mr. Gray has increased the confusion by giving fragments of descriptions instead of genuine and specific characters, probably from carrying too far a laudable desire for brevity. His essay deserves praise however for recording many new forms hitherto a thing unknown."

In the same work Mr. Forbes has arranged the Echinodermata in six orders, the three first of which are con-vincing and the Stellildians:

1. Pentasteridae; Ophiurodea. First appearance of cirri, sprouting from brachial membranes, which, with the true arms, form the organs of motion.

2. Spinograda. Ophiuridae.—Disappearance of brachial membranes, cirri as before; true arms clothed with spines for motion.

3. Cirrhigrada. Asteridae.—Arens disappear; body more or less lobed, and lobes channelled beneath for cirri, which act as suckers, and are the organs of motion.

He looks upon the Echinodermata and Arachnoidea as two parallel groups, and holds it as a law that the divisions of parallel groups should be based on a common principle. (Introduction, p. xiv.)

FOSSIL STELLILDIDANS.

The number of fossil species of Comatula given in the last edition of Lamarck is five, including Comatellurella Wageneri, Münst., which is marked with a *; All these are from the lithographic slate of Solenhofen, and all but the * have a name in the genus Goldfuss (Brut.). But Agassiz considers the species published by Goldfuss and other genera.

Thus, on Comatula pateneta, Goldf., he establishes the genus Picrocoma, characterized by its pinnated rays, which are so developed and bifurcated that the disk would seem to consist of a perfect null, whilst he refers the three other species, Comatula tenella, pectinata, and filiformis to the genus Saccoma, which has the disk in the form of a rounded pouch, on the border of which are articulated five slender rays, simply bifurcated up towards their base and pointed.

The same zoologist views the Gymnasteridae and Ophiuroidea of Goldfuss, a fossil from the chalk, as the isolated disk of a species of Comatula.

For the fossil Encrinidae in general, the reader is referred to the memoirs of Müller, but we must here advert to the genera Hypanthropcnites and Disceroides. These Ctenidiidae genera are described and published by Professor Phillips in Murchison's Silurian System, where they are beautifully figured, with other Encrinidae, in plates 17 and 18. Both genera are from the Wenlock limestone. Murchison states that columns and plates of Crinoides occur in all the Silurian formations, from the Upper Ludlow Rock to the base of the Llandeilo flags, and also in the underlying Cambrian Rocks. The former adds that the fossil crinoids have as yet been found in the Wenlock limestone only.

M. Hermann von Meyer has lately characterised two new genera of Encrinidae, viz., Isocrates and Characirninus.

The last edition of Lamark records eight fossil species of Asteroidea, from the beds of Solenhofen, and, under Orthaster. Ag. (Orthaster, Bl.), there is a note that the Orthasteridae are the genus Hypasteria, which is a wrong opinion. The Orthasteridae are figured in the Saxonian beds, and the Orthasteridae are the genera Hysteda, Heliaster, and employed by the Linnaeans in this order. In the Orthasteridae is emplaced for the order (the 2nd) of Arachnoidea, composed by the genera Pteraster, Botellina, and Pteroporus.

*History of British Star-fishes,* 2nd Ed., London, 1841. [a]

Note: The term "Ctenidiidae" is employed for the order (the 2nd) of Arachnoidea, composed by the genera Pteraster, Botellina, and Pteroporus.
on detached ossaceous pieces; and Agassiz suspects that they are the calices of unknown Crinolids.

Dr. Mantell notes two species of Pentagonaster, Semi- lamnites being one, in the chalk formation at Lewes.

Mr. Gray has lately established two fossil genera of Star-fishes—Componaster, from the same point to the north- east of Blackdown, and Promia, comprehending the tessellat ed Star-fishes found in the chalk.

M. Dujardin observes that M. Desmoulins has described (Act. Soc. Linn. Lond., t. v., 1832), under the names of Asterias portuloides, A. leonis, and A. Adriatica, the inflated small bones (ossicles) of star-fishes (Asterias) coming from the tertiary formation; and that the same author gives the names of A. straitiera, A. chilipora, and A. punctulata, all of the same formation; but M. Dujardin observes that the characters could only be taken from the very variable form of these ossicles, and the more or less smooth, or more or less punctated and granulated, state of their external surface, and consequently they do not appear to M. Dujardin to possess sufficient value.

In truth, he adds, as much might be said of many of the species established by Goldfuss, and also of two established by Agassiz under the names of Gonisteria punctata and Gonisteria lunata, described, it is true, as endogens, but which are endogens.

The Stem, or ascending axis, is composed of fibrous, spiral, and cellular tissue, arranged in various ways, mostly assuming a cylindrical form, and having a perpen dicular direction, and bearing upon it the various parts of the plant. The stems may present great variation in their structure: they possess a central pith, and radiating medullary rays filled up with woody tissue, which is deposited in zones of yearly growth, and the whole is covered with an outer husk formed by the leaves and branches. They possess no pith or medullary rays or bark, but the same tissues which exist in the exogenous are distributed irregularly throughout the mass of the stem. [Endogens.] In their mode of growth they also differ, for whilst the increase of the plant is parallel in the case of endogenous plants, in the circumference, the endogenous stem deposits its tissues from the circumference towards the centre. In acrogenous the stem is mostly composed of cellular tissue, and only in a few of the higher orders does it possess a cylindrical form. Of these, the stems of true Ferns are most conspicuous, which contain, in addition to the cellular tissue, both woody and vascular tissue in their structure. The mode of development of the stem of acrogenous is also different from that of the endogenous, and the disposition of matter originating in the leaves, it appears to be a mere extension of some common vegetating point, which becomes cylindrical and long, when it is capable of being acted upon by the influence of light, as in Ferns, Lycopodium, &c., which expands irregularly and remains flat and foliaceous in such orders as Hepaticae and many Algae, which develop in straggling threads in some of the latter, and which collects these threads into masses of reproductive matter in Fungi! (Lamatt. Nat. Hist. 1827, p. 17.

Although the age of the plant in the large bulk of the orders will at once point out the class to which they belong, yet there are exceptions, and in many instances the structure of the stem would be no guide to its class. This is particularly the case of the leafless species of the Marches, marshy, and watery places. Thus Ptilaria, Marsilea, Isocelis, and Salvinia, amongst acrogenous; Nuia, Caulainia, Zanichellia, Zoster, and Potamogoton amongst endogens; and

Hippuris, Myriophyllum, Callitriche, Trapa, and Ceratophyllum amongst exogens; have a structure closely resembling each other, from which alone the class to which they belong could not be assigned.

Although the most common direction taken by the stems of exogens and endogens is vertical, a great number of them depart from this course, and on this account, or for some peculiarity of form or function, they have received a variety of distinctions. In some plants the stem or primary ascending axis is never pushed above the surface of the earth, and hence stems thus termed are called subterraneous. These stems were mistaken by older botanists for roots, and this error is still frequently committed, but the mode of their growth and their structure will at once distinguish the subterranean stem from the root. [Root.]

A common form of the subterranean stem is the tuber, of which a good example is afforded in the potato. The tuber is in reality only the thickened part of a subterranean stem, as may be easily seen on examining a bunch of its leaves in the common potato. The tuber mostly produces at irregular intervals buds which are called eyes, any one of which, being removed by a knife, is capable of existing, and forming, when detached, a new plant. Tubers frequently contain many tubers, and these afford examples of this form of the stem.

The cormus is another form of subterranean stem. It is only seen in endogenous plants, forming a dilated basin from whence the leaves issue; an example is afforded by the aconitum. It is often mistaken for a bulb, but differs from that organ in being entirely solid. The cuscus, the oselie, and the azon afford examples of this form of the stem.

The soboles, or creeping stem, is another form of the subterranean. It runs horizontally under the surface of the earth, giving off at intervals roots and buds. It is frequently called a creeping root. The best example is the couch or spear grass. It is on account of the facility this kind of stem affords to the plant for the dissemination of its seeds. Only a small portion left in the earth will be sufficient to reproduce the plant, which soon rapidly spreads by means of its creeping stems.

These stems which appear above the surface of the earth are called terrestres, and are of the following forms: which are commonly distinguished:—The root-stock, or rhizoma, is a prostrate hardened stem, scarcely distinguishable from the roots, giving off branches or young plants. It is seen in the Aquilagin Phil. Mus. Perna aquilina, Juncus effusus, Iris germanica, Nymphaea alba, &c. The succous, or Sucker, is a branch which proceeds from the neck of a plant beneath the surface, and becomes erect as soon as it emerges from the earth, immediately producing roots and branches, and ultimately rising above the earth. (Lindley.) This term has been very variously used by botanists, but the above definition expresses its most frequent and legitimate application. Link uses the word soboles synonymously with it. The stem is only a modification of the root-stock, and is a slender, horizontal, or occasionally long slender, running upward the ground and forming at its extremity roots and a young plant. This is seen in the strawberry. In Orchidaceen, the leaves and flowers are developed from the apex of an oblong green body which in its structure resembles a root; it is above ground; this form of stem, peculiar to Orchideaous plants, is called a pseudo-bulb.

The stem, being the primary axis of the plant, necessarily supports all the other organs. The first stems which are developed is the leaves, which grow from a point of the stem called the node. These nodes are either opposite each other or alternate on the stem, and the space between them is called an internode. The internode is composed of tissues which are arranged parallel in a vertical direction; but when a node is formed, the tissues take a horizontal direction, passing into the leaf at an angle with the stem. At this point the tissues are more or less contracted, from the suspended vertical direction, and in some plants this is always evident, as in many Lamiacees, in grasses, and the bamboo. The point of union between the leaf and stem is called the azzil, and at this point constantly developed a bud. (Leaf-Bud.) Although in all cases this bud is called a leaf-bud, there is no constant agreement as to the existence of a leaf. The consequence of the growth of a bud is the formation of a branch (ramus). When the branches are numerous, the smaller ones are called ramuli.
and a collection of branches forming the head of a forest-
tree is called a coma.

On the other hand, the stem are to support the various
organs of the plant, to serve as a medium for conveying the
sap from the roots to every other part, and to become the
depository in many plants of their various secretions.
(For further information see Sap; Secretions, Veg-
table.)

STE/MMATOPUS. [Sachs, vol. xxi., p. 164.]

STENCILLING. [Paper-Hanging.]

STENOSAURUS. [Crocodile, vol. viii., p. 158.]

STENODERMA. M. Geoffroy's name for a genus of Bats.

[CHRISTOPHER, vol. viii., p. 26.]

STENOGRAPHy, or the art of short-writing, is a term

compounded of two Greek words, στένος, contracted, and
γράφειν, to write. The invention of stenography among
the Greek writers is justly assigned to Stenography,
but it is said that the art was first practised by Pythagoras,
and that the poet Ennius was the first who adopted a sys-
tem of short writing by which a person was enabled to follow
a speaker. It is said, though upon no very certain testimony,
that he could employ a shorthand of his own invention, and increased the number as circum-
stances required.

There are also writers who ascribe the invention of the
art to Cato, who is said to have retained some rudiments of
the system both of its brevity and secrecy. He remarks (Ad. Alt.,
xxiii. 32) his friend Atticus that he wrote (κόπος) by signs.
The art was communicated by Cicero to Tiro, his
freemason, who made considerable improvements in it, and
had recourse to shorthand, but Cicero employed it to the
purpose of taking down public speeches. Eusebius
attributes the invention to Tiro. The oration of Cato rela-
tive to the Catilinarian conspiracy, was preserved by means
of shorthand. We are informed by Plutarch, in his 'Life
of Cato' (c. 23), that on the occasion of delivering that
speech, 'Cicero dispersed about the senate-house several
expert writers whom he had taught to make certain figures,
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and who did, in little and short strokes, equivalent to words,
and who did, in little and short strokes, equivalent to words,
The conscientious student of a bad system may out-
strip the negligent pupil of a skilful master; as those
by whom Gurney's system has been practised could only
have attained eminence as shorthand writers by the exercise
of the utmost diligence and perseverance.

Among the more recent systems, that of Dr. Byron de-
servedly occupies a very prominent position. He succeeded
in forming an alphabet at once simple, precise, and practi-
cable, as well as in rendering the general details of his
system incomparably superior to any which had preceded it. Indeed
Dr. Mavor (himself the author of a deservedly popular trea-
tise on shorthand) observes, in the introduction to his own
work, that 'it is above the reach of human ingenuity to ex-
ceed Dr. Byron's (a plan, which, last for ever) to
be the basis of every future rational system.' Numerous
other writers have also borne their testimony to the merit of
Dr. Byron's plan. Although the treatise was completed by
the year 1720, it was not published till 1767, after the
author's death, who, as he depended for support principally
upon private tuition, obtained an act of parliament for
the security of his invention. The doctor, in 1749, printed fifty
copies of his work for the use of his particular friends.
Since its publication it has been edited by several persons.
Mr. Thomas Molineux, of Macclesfield, published an edition
which he entitled 'An Introduction to Dr. Byron's Uni-
versal English Shorthand.' It was popular for many years;
but its circulation has latterly been much diminished owing to
the numerous treatises on shorthand, general and particular.
Many years after the appearance of Mr. Molineux's book,
Mr. William Gawtress of Leeds, then one of the proprietors
of the 'Leeds Intelligencer,' published a 'Practical Intro-
duction to Shorthand' (under Dr. Byron's general direction),
which for ever was a useful and indispensable work. This
unpretending volume is one of the cheapest and most
useful manuals of shorthand which ever appeared. It con-
tains many improvements on the original work.
The system next deserving of notice is that of Taylor,
which made its appearance in 1766, and is entitled 'An
Essay intended to establish a standard for a universal Sys-
tem of Stenography or Shorthand Writing.' This author's
system is superior to that of Byron in several particulars;
but principally in a greater brevity and simplicity of the
alphabet, and the facility with which the various characters
may be joined to each other; all points of the utmost value
and importance. Some useful practical improvements upon
Taylor's system have been made in Mr. Harding's treatise
on the art.

Dr. Mavor's system, though it obtained considerable
popularity, is inferior to that of Taylor, on account of his
alphabet requiring a greater number of strokes of the pen,
and the characters being more difficult of junction. Since
the publication of Dr. Mavor's treatise, many others of
various degrees of excellence have been published, most
of which are merely improvements of merit. Those of Rich-
ardson and Cleve are undoubtedly very ingenious, but they
are too difficult of attainment to be generally useful. This
is moreover especially the case with reference to the former. The
author claimed for it the merit of enabling a person to
write more in one hour than in an hour and a half by any
other system previously published. His principle is totally
different from that of any other writer. He accomplishes
his object by means of three horizontal and two perpendi-
cular lines, which are placed at about the same distance
from each other as the lines of the musical scale. These
five lines furnish him (as he observes) with twenty distinct
places or situations, which are called by the names of the
different letters of his alphabet; and in writing by this
system, the initial letter of every word is invariably omitted;
the writer placing his pen on the place which represents
that initial letter, from whence proceeds to write the second
and subsequent letters of the word. The great exactness ne-
necessary in the formation and position of the characters
must present an insuperable difficulty to the general adoption of the system. Where however any person can
practise with it the requisite facility, it is undoubtedly
the best which ever was invented for the purpose of following
a speaker. Cleve's system is founded on a much more
moderate application of the line principle than that of
Richardson.
The foregoing remarks contain a brief history of stenogra-
phy in this country; but there is scarcely a country in Europe
where it has not paid more or less attention to its cultivation.
Those who desire further information as to the history of
the art will find much valuable matter in Mr. Lewis's
'Historical Account of Shorthand.' The following al-
phabets will in some measure illustrate a portion of the fore-
going remarks as to the improvements which have from
time to time taken place:

| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |


One experienced shorthand writer at least is now an in-
dispensable auxiliary in the office of every well-conducted
journal, and to shorthand writers we owe full reports of the
proceedings of parliament in the daily meetings, and to the
courts of law. The newspaper press has been a powerful
stimulus to the cultivation of the art, by affording a respect-
able livelihood to a numerous body of individuals. In
addition to what it has done for the daily and weekly press in
affording a ready and inexpensive medium for the com-
mon man to buy and sell, it has done much to raise the
scientific lectures, and public speeches both in parliament
and at the bar. The publication, from the shorthand notes
of Sir Henry Cavendish, a member of the 'Unreported Par-
lament,' as it is termed, which sat from 1766 to 1774, and
from which the present work was first taken, has added
much to the political history of the country, which we owe
to the art of stenography. The shorthand notes written
giving account to Gurney's system were found amongst the
Egerton MSS.

By students of divinity, medicine, law, or others who may
wish to preserve the whole or part of discourses or lectures
on scientific or other subjects, shorthand may be studied with
great advantage. The art however is not to be acquired
without the diligent application of many months, and it also
requires considerable attention to the pronunciation of
speeches and travelling teachers of stenography occasionally

* As improved by Harding in the positions of the vowels.

assert the contrary. The pupil who is dulled in this man-
ner, finding, after he has received the stipulated number of
lessons, that he is unable to practise the art, distracts either
his own capabilities for learning, or the assertions of his
teacher, and thus abandons the study of the art in despair
or disgust.

We shall now give a brief summary of the principles of
stenography, according to the system of Taylor, as improved
by Harding.

Of the Alphabet.—The vowels are represented by points,
period standing for a, e, and i, and a comma for o and u.
The single consonants of the shorthand alphabet amount
only to sixteen, c and z being rejected as unnecessary, the
which has not paid more or less attention to its cultivation.
For the same reason, g and h are represented by one character.
Characters are also assigned to double consonants, such as ch, sh, and th. These double consonants
conduce to both peripetia and expedience. The vowels
are distinguished from each other by their position. For
instance, should the period be placed over the top of a
consonant, it signifies a; if placed against the side, or oppo
site the centre of the consonant, it becomes a; if placed at the bottom, i. The personal pronoun I is represented by a mark similar to the top part of a note of admiration. The consonant a is when placed in the same situation as the dot or period for a, and u when in the same situation as the dot for e. Where vowels have been generally omitted, either through the haste of transcribing remarks on any subject, or for expedience in following a speaker, they ought, where such a course is rendered necessary, to be supplied immediately afterwards, while the subject written is fresh in the recollection of the writer. In all words which have neither incompressible, terminative, nor long vowels, no middle vowel should be expressed unless some peculiarity may render it expedient or necessary to deviate from this general rule. A word of more than one syllable, having a long vowel in it, must generally have that vowel expressed, because the long vowel being found in that syllable which is most distinctly heard in pronunciation, affords the greatest help in reading; at the same time, however, when a word of more than one syllable consists of several consonants, even the long vowel may be frequently omitted. The various characters of the alphabet represent, when placed by themselves, a number of small words. For example, the a or an is written by a dot; the and also by a comma, the former being written above the line, and the latter below. The consonant b represents the word be, by, been; d, do, did, done; t, off, of, if; g, God, give, go, good; h, have, he; k, know, known; l, Lord, all, tell, and so on throughout the alphabet. For the attainment of practical productivity in the art, it is necessary that the alphabet should be acquired so perfectly as to be written correctly four times in a minute. It is necessary also in this place to explain that d and r, which in the alphabet appear to be precisely the same in form, are distinguished by the former, when joined to another consonant, being written downwards, and the latter upwards.

Qf Prepositions and Terminations.—Prepositions and terminations are the letters or signs by which the first and last syllables of words are represented. The whole of the single and double consonants of the alphabet are employed in denoting the beginnings or endings of words; in which situations the letters are not joined to the other part of the word, but placed so close as to show their connection and prevent their being mistaken for separate and independent words. The letter b represents the prepositions abs, obs, &c.; and the terminations ble, ble, bly: the letter d, the prepositions de and des, and the terminations dom, end, end, &c.; the letter f, the preposition for and the termination ful; and the other alphabetical characters are appropriated in a similar manner. Besides the consonants, several arbitrary marks are also used to denote the endings of words. In many cases a preposition and a termination together are all that are necessary to represent a word.

Qf Arbitrarians.—In the system of Taylor very few arbitrarians are employed. They do not exceed twenty in number, and may generally be employed with advantage, which is more than can be said of the arbitrarians of several other systems. The experienced shorthand writer may readily, and with much benefit to himself, increase the number of these marks as occasion may require. For instance, the individual who acquires the art of writing shorthand for the

**STENOPHYS**

**Abbreviation.**—As in following a speaker all the vowels require to be omitted, and the consonants only written, so all the small words in a sentence are likewise left out. In some cases however, where the speaker is deliberate and the writer is expert, nearly all the sound may be impressed. In this instance there arises a different order of sentences:—of course the writer is guided by his own judgment and the necessities of the case. The different tenses and moods of the verbs are generally expressed in the English language by the help of other verbs, as shall, have, had, can, could, may, are, was, etc. These being written in their respective forms may be joined together; but a point should be inserted over the characters, to signify that they are the first letters of the words in the sentence. The radical part of a word too may often be sufficient to denote the whole word, exp. for expenses, pos. for possible, and so forth. A mode of contraction much used in common writing is to express the first and last consonants of a word, inserting a dash in the middle to show that it is deficient. This plan may be very convenient in a shorthand writer who may not be occasionally used. If the characters cannot be distinguished by the plan first pointed out, the termination may be written under the first consonant. The usual abbreviations may be generally rendered in this way. The first letter of a sentence is to be repeated, a line may be drawn under it, and a caret placed where the repetition should be read.

As our object is not to supply a manual by which the art of shorthand may be acquired, but rather to afford some information concerning its leading principles, we have omitted explanations of minor importance.

**STENOPHYS,** illiger's name for a genus of **Prosimii,** his third family of his second order, **Ptilicota,** or **Mammalia**... **Lemur** and the genera **Loris** and **H.**

Mr. Bennett, in his **Gardens and Menagerie of the Zoologetic Society,** observes that in an early memoir on the family to which the **Lemur** belongs, **Geo-**
froy St. Hilaire divided it for the first time into those minor groups of which it was most obviously composed. But Mr. Bennett remarks that M. Geoffroy has since carried the principle of subdivision to a still greater extent by separating the **Lemur** from the slender **Loris** with which it is sometimes associated, and adding to it and some other doubtful species the genus **Nycticebus**. Mr. Bennett cannot perceive any sufficient grounds for thus dividing two animals so intimately allied to each other, and which differ in no more essential characters than the somewhat greater length of the nose of the former and the antlers of the latter than in the other. For this reason Mr. Bennett prefers M. Geoffroy's older arrangement, and proceeds in accordance therewith to describe the **Lemur** and **Loris** as separate genera, and circumscribed natural genus, differing from the Lemur of the same author in many highly important characters.

Mr. Bennett adds, that it is to be regretted that M. Geo-

froy should not have applied the latter name to the species to which it was originally given by Linnæus, and to which alone it is, in Mr. Bennett's opinion, in any degree applicable; the Madagascar animals at present comprehended under it not presenting, he observes, even one of those peculiar characters which Linnæus himself states that his generic name is founded.

In common with the latter group," says Mr. Bennett in continuation, the genus **Loris** forms part of that division of the Quadrumanous order which is essentially distinguished by an uneven number of irregular disposition of the incisor teeth in the two jaws; terminal nostrils with sinusous openings; and a long subulate or sickle-shaped claw upon the fore-finger of the hinder hand; all the rest of the body long, flat and rounded, the head of the greatest part of the monkeys and of man. The **Loris** differs from the other genera of this family in having four incisors in the upper jaw, placed in pairs with a vacant space between and six in the lower, directed obliquely forwards; canine teeth none; twelve molars, or molars and premolars, with short rounded head and little or no tail. Sometimes, I would appear, the lateral incisors of the upper jaw, which
We first notice Loris gracilis.

**Loris gracilis.**—Visage produced and dog-like: forehead high above the nose; ears large, thin, and rounded; body slender and weak; limbs very long and slender; thumb on each foot more distinct, and separate from the toes; on that and the three outmost toes are flat nails; on the interior toe of every foot is a crooked claw; tail; the hair on the body universally short and delicately soft; the colour on the upper part tawny, beneath whitish, space round the eyes dusky; on the head is a dark-shaped spot with the end pointing to the interval between the eyes. Length from the tip of the nose to the anus only eight inches.

**Habits.**—Pennant, whose description we have given, states that notwithstanding the epithet (tardigradum) given in Seba, which has figured the animal (male and female) in the 53d plate of his first volume, the Slender Lemur is very active, ascending and hanging the actions of an ape. 'If,' says Pennant, 'we credit Seba, the male climbs the trees, and tastes the fruits before it presents them to its mate.' Seba himself observes that the epithet tardigradum is misspelled. Others say that it is a melanchoaly animal, silent and very slow, sleeping in the day and only awakening in the evening, and living upon insects, fruits, and eggs.

**Loris tardigradus.**—The most accurate description known to us is that given by Mr. Bennett, in the work above quoted, and which we here present to our readers in his own words.

*The Slow-paced Lemur is an animal of small size, scarcely equal to that of a cat. The largest individual yet noticed appears to be that seen by Pennant, who states its length at no less than sixteen inches from the nose to the extremity of its back. Its proportions are short and thick-set; and the apparent clumsiness of its form is much increased by the manner in which it usually contracts itself into a kind of ball. Its head is broad, flat, and rounded, with a slightly projecting and pointed muzzle, in which the nostrils are perforated laterally. Its eyes are large and perfectly orbicular, and furnished with transverse pupils capable of being entirely closed during the day, and of being very largely dilated at night; these latter appear situated so low towards the nose that the motion of the eyelids appears to take place in a diagonal instead of a horizontal direction. The ears are short, round, widely open, but bent in the head, and the tail is merely rudimentary, consisting of a few lines in length. The hinder limbs are considerably longer than the fore. The whole of the body, with the exception of the muzzle and hands, is thickly invested with hair, which is close woolly hair of a deep sandy grey with something of a brownish tinge. A deep brown or chestnut band passes along the middle line of the back, and is accompanied on either side by a faint grey stripe, expanding on the back of the head into a still lighter patch. The dark middle stripe divides on the head into two branches, each of which is again subdivided, the posterior division passing transversely across the forehead and enclosing the ear, the anterior crossing the eye obliquely and extending to the angle of...
the mouth. Between the two, above the outer angle of the eye, is a large white spot. Each of the eyes is surrounded by a ring of dusky black, between which a narrow white line passes from the back part of the head to the tip of the nose, which, with the exception of the naked muzzle, is also white. The latter, together with the naked parts of the hands, is of a livid flesh-colour with a tinge of black. On the under surface the fur is of a lighter grey than above.

There are some parts of the organization of this animal that require particular notice.

Sir Anthony Carlisle injected the arterial system of a Lamur tardigradus, and upon tracing the course of the vessels, so as to make a dried preparation, which is now in the Museum of the Royal College of Surgeons in London, he found an unusual arrangement of the arteries. He was exhibited by the large trunks of the subclavian and external iliac arteries. He shows that immediately after the subclavian has penetrated the axilla, it is divided into twenty-three equal-sized cylinders, which surround the principal trunk of the artery, here diminished in size to an inconceivable vessel. These cylindrical arteries, he observes, accompany each other, and divide with the ulnar and radial branches, being distributed in their route upon the much greater number of vessels, which has one to each of these cylinders. The other branches, for example the radial and ulnar, proceed like the arteries in general, dispersing themselves upon the skin, the membranes, joints, bones, &c., in an aberrant form. The latter, he tells us, divides upon the margin of the pelvis into two vessels, by equal-sized cylinders, surrounding the main trunk, as described in the auxiliary artery; these vessels are also finally distributed as in the upper extremity; the cylinders wholly upon the muscular parts. It is observed, that the vessels on all the bones, the cylindrical arteries, he adds, do not divide into equal-sized cylinders, but are distributed as in the generality of animals.

Sir Anthony concludes by observing that it would be of some importance in physiology to ascertain whether the other moving quadrupeds have any peculiar arrangement of the arteries of those limbs. This solitary fact, he remarks, is hardly sufficient for the foundation of any theoretical explanation of the slow movement of these animals: if however it should be corroborated by similar circumstances in other animals, he thinks that a new light may be thrown upon muscular motion, by tracing a connection between the kind of action produced in a muscle, and the condition of its vascularity or supply of blood.

Mr. Baird, in his interesting paper in the Magazine of Nat. Hist., vol. i, 1829, remarks that all the known Mammalia close their eyelids in a direction upwards and downwards, and, in general, the upper eyelid is the one peculiar to the Slow Lemur. The greatest degree of eye-motion in this animal is done in the direction of its length, and observation has shown, that wherever in his slow-paced Lemur, the eyelids were brought together in a diagonal direction, or outwards and inwards, which gave the animal at the moment of shutting its eyes a peculiar look. It was the upper and outer eyelid that had the greatest degree of motion, the upper or inner one being almost fixed; and he concludes that the orbicularis oculi must be very powerful. After the death of the animal, and when Mr. Baird had left this country on a second voyage to India, the eye was examined by Dr. Knox, who found that the peculiar movement of the eyelids above described did not depend on any peculiar structure, but merely on the greater degree of strength of the orbicularis muscle.

Mr. Baird also observed another peculiarity in the species, "Beneath the tongue proper," says he, "if I may so call it, which is somewhat like that of the cat, though not rough, is another tongue, white-coloured, narrow, and very sharp-pointed, which projects along with the other one when he eats or drinks, though he has the power of retaining it within his mouth at pleasure." Mr. Baird however had not been able to see any particular purpose to which he applied him use this double tongue when he ate or drank, of which he was exceedingly fond, snapping them up most eagerly when presented to him, and catching them himself when they were reposing in the evening upon the walls of the room.

Sir William Little or nothing certain appears to be known of the habits of the Slow Lemur of Bengal in a state of nature, except as they may be inferred from those which it exhibits in captivity. In this latter state many good observers have narrowly watched it, and have recorded the observations.

Vosmaer received one in June, 1768, and kept it in a chamber. It slept all day to the evening, not waking (being summer) till half-past eight. It was shut up in an oval cage on bars, and could see only a hand sitting on its hinder parts close to the bars, with its foot brought forwards between its fore-feet, which were bucked against its belly. In this attitude it held on strongly to its wires with its hind feet, and often by one of the anterior feet which it used, and which induced Vosmaer to think that the animal ordinarily slept in trees attached to the branch. When awakened, it moved very slowly, and always the sun from the commencement to the end, dragging itself from bar to bar, grasping one about its fore-foot to raise itself, which it held till it was sufficiently excited. It was very skilfully seized another with one of its anterior feet. The same slowness marked its creeping on the ground, along which it dragged one foot after the other, as if it had been paralysed. In this mode of progression it raised its body but very little, so little, so that as it dragged itself forward, the belly was frequently not more than a breadth of a finger from the ground. It was vain to tempt it to drive it by putting a stick through the bars; for when it perceived it to be touching the wire behind which a defence was biting the stick. As the evening approaches it awaked by degrees, like one whose sleep is broken at long intervals. Its first care was to eat, for the day he observed was a fast day. It had been said to be of a peculiar diet, the flesh being very finely parched and parched, with parched bread. It was eaten with an equal taste. This it would eat birds, gave it a live sparrow, which instant killed with a bite, and ate the whole greedily. If it gave a live cockchafer, to try whether it would eat insects it took the offering in its paw, and devoured it completely. Vosmaer afterwards gave it a chaffinch (pinpin), which ate with much relish, and afterwards slept for the remainder of the day. He often saw it still awake at two hours past midnight; but from half past six in the morning its sleep was so sound, that its cage might be cleared and shut up during the day, and opened in the evening. In order to tease it, it was vexed, and bit the stick; but with a very slow motion, repeating the cry at, at, at, drawn out at each time into a plaintive, languid, and tremulous note. This, if it thought it was too fast, it would shut the mouth. When it was thus harassed for a long time, as thoroughly roused, it crawled two or three times round the cage, and then slept again.

The specimen observed by Sir William Jones was a male as Vosmaer's appears to have been; and Sir William the gracefully describes its habits:—"In his manners he was for the most part gentle, except in the cold season, when his temper seemed wholly changed; and his creator, who had the care and disposal of cold, was alone affected in his natural disposition. He has been exposed even in his native forests, gave him, probably, for that reason, its thick fur, which we rarely see on animals in these tropical climates: to me, who not only can hardly bear the sight, but abhor the sight, it seems to have been treated with more severity than others, he was at all times gentle; but if I disturbed him in winter, he was usually indignant, and seemed to reproach me with the uneasiness which he felt in its posture. He never put his body in a position that resembles the sitting in a proper degree of warmth. At all times he was pleased with being stroked on the head and throat, and frequently suffered me to touch his extremely sharp teeth, but at all times his temper was quick; and when he was unusually troubled, he gave it out by an obscure murmur, like that of a squirrel, or a greater degree of displeasure by a peevish cry, especially in winter. When he was often as fierce, on being much importuned,.
as any beast of the woods. From half an hour after sunrise to half an hour before sunset he slept without intermission, rolled up in his cage, and only awoke when he was disturbed, and began to prepare himself for the labours of his approaching day. Licking and dressing himself like a cat, an operation which the flexibility of his neck and limbs enabled him to perform with much grace, he made his breakfast, after which he commonly took a short nap: but when the sun was quite set, he recovered all his vivacity.

His ordinary food was the sweet fruit of this country; plantains always, and mangos during the season; but he refused bananas and coffee berries. He ugli was milk he lapped eagerly, but was contented with plain water. In general he was not voracious, but never appeared satiated with grasshoppers, and passed the whole night, while the hot season lasted, in prowling for them: when a grasshopper met him, he pounced upon it in a manner which I never observed elsewhere. He has not, as far as I can determine, a sense of smell; and his eyes, which he fixed on his prey, glowed with uncommon fire; and having drawn himself back, to spring on it with greater force, he seized his victim with both his fore-paws, and held it in one of them while he devoured it. For other purposes, and sometimes even for that of holding his food, he used all his paws, indiscriminately, as hands, and frequently grasped with one of them the higher part of his ample cage, while his three others were severely engaged at the bottom of it. As he ran about the cage, when paddling like a fish, filling with all four of them the upper wires, his body was inverted; and in the evening he usually stood erect for many minutes, playing on the wires with his fingers, and repelling them, in a manner like the menagerie, from side to side, as if he had nothing to move, and the utility of exercise were not his only refinement.

A little before day-break, when my early hours gave me frequent opportunities of observing him, he seemed to solicit my attention; and if I presented my finger to him, he licked or bit it, with great gentleness, but eagerly, took fruit when I offered it, though he seldom ate much at his morning repast: when the day brought back the night, his eyes lost their lustre and strength, and he composed himself for a slumber of ten or eleven hours.

My Lemur was frequently seen to use his hands; and when he was found lying in the same posture in which he would naturally have slept, I consigned myself with believing that he had died without pain, and lived with as much pleasure as he could have enjoyed in a state of captivity.

Mr. Baird, in the paper above quoted, gives an account of one of these Loris (loris, a clown, Dutch; name in Ceylon, according to that gentleman). Mr. Baird's specimen was a male, and was obtained at Pulo Penang (Prince of Wales's Island), when Mr. Baird wrote, he had been in possession of the animal upwards of nine months. Its food consisted of fruit and small animals, such as birds and mice. The plantain was the fruit of which he was the most fond, and was the only food he would eat. He is said to take all insects, and to eat the leaves of various plants. The necks of fresh-killed fowls formed the major part of its sustenance during the voyage. It was particularly fond of small birds: these, when put into his cage, he killed, and picked them, stripping off the outer coat of the feathers while he was eating the bones as well as the flesh. Veal was preferred to all other butcher's meat, and it was fond of eggs; meat boiled, or otherwise cooked, it would not touch. Sugar appeared to be grateful to its palate, and it ate gum-arabic. As flesh is not always to be had quite fresh (the only state in which it is acceptable to him), he has for some time past been fed upon bread soaked in water, and sprinkled with sugar; this he eats readily, and seems to relish it much. Mr. Vosmaer mentions it once passed it with moistened water; neither would it ever taste water. This is completely at variance with the habits of my animal, for he not only eats moistened bread, but laps water like a cat. When food is presented to him he ingests it with both hands, and letting go with his right, holds it with his left all the time he is eating. Frequently, when feeding, he grasps the bars in the upper part of his cage with his hind paws and hangs inverted, appearing exceedingly intent upon the food he is eating. It is a quadruped of the forest, and the plants of the Savannas me known me ex it is found in the woods on the coast of Cordemandel; another has been sent to a member of our society from one of the eastern isles; and though the Loris may be a native of Sifân, yet I cannot think it unaccountable, and decide animals mentioned by Thevetan, which it resembles neither in size nor disposition.

The juice into his mouth.' Mr. Baird, after noticing the cry mentioned by Vosmaer and Sir W. Jones, says, 'When the cry stops, he begins to thump and roll over. He then runs and stamps out with both fore and hind legs. If he is not prevented, he is filled with rage, and is ready to attack and bite. He heaved to be stroked under the chin and throat, and also under the arms, turning his head round to the hand like a cat, and lifting his arm, stretching it out beyond his head. Though not seen by a very sensitive smell, but evidently capable of feeling kindness and showing resentment. He allows his throat and fore-arms to be stroked, but refuses to let the same liberty be taken with his lower limbs. For some time while in China, a little Chinese dog was his companion, sitting in the same place and with the exception of a few occasional jays, they lived very comfortably together. As the dog grew up however they were separated. A cat, the only animal in the house besides himself, has made many overtures to him, and when he is allowed to get out of his cage, he is followed up and down the room by his feline companion, who evidently wishes to make him her playfellow.

Any undue familiarities however on her part are met with an immediate repulse from him; and, one day, a small rat which he kept in his cage, and by which he had occasion to be annoyed, he bit her so severely, that she now, though evidently wishing to be on good terms with him, keeps at a safe distance. This same cat has, since then, become more familiar. Though not daring to approach him, she follows him wherever he goes, and is observed to act the part of an object of his abhorrence. He cries out on her approach, and is sadly tantalised by her playful trick of leaping over him. He seems to be rather a social animal notwithstanding. A large jappaned tray attracts a good deal of his attention. Seeing his image reflected in it, he walks before it, and tries to grasp his own image. Finding his efforts ineffectual, he imitates the action of the child, by peeping behind it, with expectation to see the object there. Before a couple of looking-glass he will sit for hours, starting and using it, not the least of which most respects, the rest of Mr. Baird's description agrees with those of Vosmaer and Sir W. Jones.

M. d'Osslonne's memoir is very interesting, but offers no differences sufficient to justify the insertion of his account of his specimen at length. The little animal, which enjoyed comparative liberty, being suffered to go at large, appeared to him to be very much attached. He used to caress it after giving it food; and the marks of sensibility upon the part of his favourite were, taking the end of his hand and pressing it to its bosom, fixing, at the same time, its half opened eyes upon his.

One that Pennant saw in London, slept holding fast to the wires of its cage with the aid of a certain provender which the inhabitants of Bengal call the animal Chirimundi Billi, or Bashful Billy. Sir W. Jones says of it, 'The Pandits know little or nothing of the animal: the lower Hindus of this province generally call it Lajibâmar, and the Bashful Ape; and the Muhammadans doubt that its habits are, for the most part, arboreal; and that it takes its prey by night, seizing that which is living, such as small birds, mice, and insects, by surprise, probably whilst they are sleeping; and varying its diet by having recourse to fruits.'

Localities. — 'As to his country,' says the author last quoted, 'the first of the species that I saw in India was in the district of Tipra, properly Tripurâ, whither it had been brought, like mine, from the island of Mount Oceanus.' In another place it is stated that it is found in the woods on the coast of Cordemandel: another has been sent to a member of our society from one of the eastern isles; and though the Loris may be a native of Sifân, yet I cannot think it unaccountable, and decide animals mentioned by Thevetan, which it resembles neither in size nor disposition.'

Vol. XXIII. — E

P. C., No. 1426.
It has been found in other parts of the peninsula of Hindustan, and in Java, Penang, and Ceylon.

The first part of the manuscript was published in Latin, Patavi, 1733, 8vo, by Dominique Pizzirani together with Democritus, Synesius, and other writers of the same subject. The writer was a Christian, and its subject was a religious one. It was published in 1733, 8vo, by Pizzirani and another writer.

It may be mentioned that the father of Alexander Traianus (Alex. Trall, De Re Med., lib. iv., cap. 1, p. 230, Gent.), and a physician of Edessa, sent by Justinian ambassador to the Persian king (Proc. De Re Med., lib. iv., cap. 1., p. 230, Gent.), must not be confused with the other mentioned in this notice, both of whom probably lived much later.

STEPHANUS BYZANTINUS, a Greek grammarian, the author of a geographical dictionary, the earliest partly by ever written. Nothing is known of his life, and age is uncertain; he is placed by Saxius (Onomastic. i. 320) in the latter part of the fifth century. Of his original work nothing but an abridgment made by Hermolaus another grammarian, who lived in the time of the emperor Justinian, has come down to us, with the exception of a fragment of the work beginning with Dyme and ending with Domona, which was first published from the Bibliothèque de l'Université de Paris, by Sambuc, in 1729, and later by Fabricius (Bibl. Gr., 1, 1729). A comparison of this portion of the original work with its abridgment will show how much valuable matter has been omitted by Hermolaus.

Constantine Porphyrogenitus, in his book 'De Administrando Imperio,' c. 25, 24, a. The notices of Byzantine history in the works of the most ancient historians are almost unknown, and are even more so in the works of the most ancient historians. Of the works published from Stephanus and given in much fuller extracts than those found in the 'Epitome,' and in one instance cites his name (I hema, 9, 'De Sicilia'; see 'Excerpta Constantini Porphyrogeniti,' ed. Heur. Valensi, p. 467; and also Ed. B. J. A. Sambuc, 'De Administrando Imperio,' c. 25, 24, a. A comparison of this portion of the original work with its abridgment will show how much valuable matter has been omitted by Hermolaus.

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rent. ex Juntar. offic. 1291, fol.; Gesner, Basili, 1553, fol.; X. jander, Basili, 1568, fol.; cum castigat.; Thomas de Pinedo, Amstel., 1678, with a Latin translation and useful commentary, and the fragment published by Tenuillius, Luc. Holsten. Lugd. Batav., 1684, with many annotations. This edition was finished by Gregorius, 1694, who republished the fragment with a triple Latin translation in the 7th vol. of the 'Thesaurus Antiqu. Graec.'

(See Saxii Onomasa, and Faberius, as cited above; also the edition of the latter, Hieronyma, and sanctificadoe.

The work of Stephanus contains many interesting particulars relative to history and mythology; it treats of towns, nations, and tribes, giving to each proper name its gentilitial adjective. It does not however appear, as some think, there was no pope with the title of Africa, or that the clergy conveyed grammatical information, and a title to the work, written at the end of the fragment already mentioned, and quoted as proving this, is not considered genuine. The number of parts added in the fragment is such as to make the least of so valuable a compilation as the whole work must have been. The notices of cities in the 'Epitome,' particularly of those which struck coins, are very useful in the illustration of the local history and topography of the ancient world.

STEPHEN, the first Christian martyr, has been supposed, on no very sufficient grounds, to have been one of the seventy-two disciples. It is more likely that he was an Hellenistic Jew, and one of the large body converted on the day of Pentecost by the preaching of Peter. This appears to have been a person of some reputation, and was one of the seven chosen to attend to the temporal affairs of the growing church. The Jews, from the different sects in which they were divided, rose against Peter, on grounds of his having the high-priest's cap in his hand; the object of this discourse has however been disputed; and it was, in fact, not fully developed by the speaker, as he was interrupted by the Jews. The pope, however, authority open, historically, the true design of the Jewish dispensation, and the consummation of that design in Christ. The object of this discourse has however been disputed; and it was, in fact, not fully developed by the speaker, as he was interrupted by the Jewish assembly. He is said to have been a person of some eminence as a poet, and lost no opportunity of contending vehemently with him; and ultimately brought him before the Sanhedrim, to give an account of his belief and conduct. In answer, he commenced with some invective against the Jews, but threatening, if they would cast off his doctrine. He was, however, encouraged by a vision of heaven opened, and of Christ glorified: on declaring which to the people, they rushed upon him, dragged him outside the city, and there stoned him to death, A.D. 31. With his last breath he invoked the pardon of God for his murderers. This was entirely an extraordinary act, the effect of popular excitation; for the Sanhedrim did not convict him, and had indeed no power to do so.

STEPHEN I. was elected bishop of Rome after the death of Lucius, A.D. 253. He was applied to by the Christians of Gaul concerning some differences which they had with Marcellus of Arles, who appears to have been an pagan bishop, and to have been sent to Rome by the people of Gaul, in order to get a settlement of the quarrels among the Christians of Spain concerning the two bishops Basiliades and Martianis, who were both deposed. Basiliades went to Rome, and, it appears, prevailed upon Stephen to take his part; but the Spanish bishops applied to Cyprian of Carthage, who approved of the deposition of Basiliades, and caused it to be confirmed by a council held in Africa. A controversy arose between Stephen and Cyprian concerning the baptism of heretics, but the authentication of this council was not perfectly legitimate, and deplored the pope. This dispute has been disputed by some church historians and critics. Stephen died A.D. 257, but the manner of his death is not clearly ascertained: the 'Aeta S. Stephani' are not considered as genuine. Of Stephen's writings we have only fragments of epistles. (Dupin; Walch; Monnucin: Collier.)

STEPHEN II. was elected after Zacharias (A.D. 752), but died three days after his election, without being consecrated, for which reason he is generally omitted in the series of the popes.

STEPHEN III., a native of Rome, was elected the successor of Stephen II., and he is styled by many Stephen II. and Stephen III. Astolphus, king of the Longobards, having shortly before married his daughter to Pepin, archbishop of Ravenna, and the Exarchate, and Pepin, the Longobard, marched towards Rome, in violation of the peace concluded between his predecessors and that see, and having advanced as far as Narni, sent messengers to the pope, requiring the inhabitants of Rome and its duchy to pay him a capitation tax, and acknowledge him for their liege lord, threatening to pillage Rome in case of refusal. Stephen, having applied in vain for assistance to the Eastern emperor Constantine the Great, and finding that time busy in breaking images and persecuting image worshipers, had recourse to Pepin, king of the Franks, whose accession to that throne in lieu of the deposed Childeric, the last nominal king of the Merovingian dynasty, had been countenanced by Zacharias, who, however, in 753, had sent two legates, to endeavour to prevail upon Astolphus to desist from annoying the pope. Their representations proving useless, pope Stephen determined to repair to France in company with Pepin's legates. Pepin received the pope, and offered the throne to him. Stephen was appointed by him in the church of St. Denis, together with his two sons Charles and Carloman. It was then agreed between Stephen and Pepin that Pepin should oblige Astolphus to evacuate not only the Duchy of Pavia, but also the Exarchate and Pentapolis, which he had taken from the Byzantines, and that those territories should be made over to St. Peter and the Roman see. Pepin, accompanied by Stephen, marched with an army into Italy, defeated Astolphus, besieged him in Pavia, and obliged him to promise to give up Ravenna with the Exarchate, which embraced the actual provinces called the Papal Legations, and the Pentapolis or present March of Ancona, including Urbino and Pesaro. Astolphus made the promise, and gave hostages to the pope, to Fronto, bishop of Arles, and to Pepin, who was appointed by him in the church of St. Peter. Stephen died A.D. 757, aged 78. A.D. 758, Pepin was enounced before that city, an envoy appeared before him, sent by Constantine Copronymus, emperor of the East, who, after praising Pepin for having driven the Longobards out of the Exarchate, demanded, in the name of his master, the former sovereign emperor. Pepin replied that the Exarchate had belonged to the Longobards by right of conquest, and also by the will of the people, who had given themselves up to king Louptrand, in consequence of the persecution of the Romans, who were envied by the emperor, whom they accused, out of their own right those provinces belonged to Pepin, who had taken them from the Longobards, and that he had thought it expedient to give them to the pope for the honour and advancement of the Catholic church, and to keep it free from the interference of the Greek power. Pepin, by the same right as those provinces belonged to Pepin, who had taken them from the Longobards, and that he had thought it expedient to give them to the pope for the honour and advancement of the Catholic church, and to keep it free from the interference of the Greek power.

(Anastasius in Flia Stephani III.) Pepin, having dismissed the envoy with this answer, continued to press the siege of Pavia, and Astolphus was obliged to sue for peace. Pepin required him immediately to deliver to his commissioner Fulrad, abbot of St. Denis, the towns of the Exarchate and Pentapolis, and to cause them to be evacuated by the Longobards. This being done, Fulrad carried the keys of those towns to Rome, and offered them to pope Stephen, who, accompanied by the whole body of the clergy of Rome, and by the principal barons of the kingdom of France, together with the solemn deed of donation signed by Pepin, his two sons, and the principal barons and prelates of France. This act of donation is lost, but from some of the expressions, gathered from pope Stephen's letters, it appears that it was made to the pope, Peter, as sovereign of God, and to the Roman republic. The city and duchy of Rome were therefore not included in the donation, as they had not been conquered either by the Longobards or by Pepin. The pope consecrated the archbishop of the Exarchate to the archbishop of Ravenna. Some critics, especially French, and Sigonius himself, assume, that Pepin gave to the pope only the 'titulus domini' of the Exarchate and Pentapolis, and retained for himself and his successors the remainder.

Soon after this memorable transaction Astolphus died of an accident while hunting, and Desiderius, king of Tuscan, etc.
was chosen by the Longobards for their king. Ratricus, brother of Astolphus, who had formerly abdicated the crown of turned monk, left his convent and aspired again to the throne. Desiderius applied to pope Stephen, who ordered Ratricus to return to his convent. Ratricus obeyed, and Desiderius was acknowledged king. In the following year (April, 878), the pope died, and was succeeded by his brother Paul I. We have of pope Stephen's writings, besides his letters in the Codex Carolinus, his 'Responsa ad Gallos,' in Baradin's 'Concilia.'

**STEPHEN IV.,** styled III., by some, a Sicilian by birth, was consecrated pope at Anagni, 876, more than a year after the death of Paul I., during which time one Constantine, a layman, and brother of Toto, duke of Nepi, intruded himself by force on the papal see, having obliged Gregory, bishop of Præneste, to ordain and consecrate him. At the time the Roman clergy moved against Duke Freiul, elected by a part of the Italian barons king of Italy; but he found a rival in Guy, duke of Spoleto, who overthrew Berengarius in battle, and was crowned at Rom in the pope, in February, 877. On the 30th of April, the 'World's champion August,' soon after this solemnity pope Stephen died, and was succeeded by Formosus. Pope Stephen is said by Guillelmus Bibliothecarius to have been a man of learning; he collected manuscripts, which he bequeathed to the Lateran.

**STEPHEN VII.,** bishop of Anagni, and a native of Rome, succeeded (a.d. 896) Benedict VI., who had not lived a month after his election, which took place on the death of Formosus. Stephen, from what motive is not clearly ascertained, deprived the son of pope Formosus, caused his body to be dismembered and stripped of its pontifical garments, and thrown into a common grave among laymen. He justified himself by the fact of the pope's son having been excommunicated by pope John VIII., in consequence of the frequent factious strifes which often broke out at Rome. Stephen also annulled all the acts and decrees of Formosus. This affair of Formosus gave rise to many disputes among the pontificals; and a contemporary writer called Auxilius wrote in defence of the memory of Formosus, 'De Ordinatione Formosì Libri Duo.' In the year 897 an insurrection of the friends of Formosus broke out at Rome, and pope Stephen, who had been deposed, was again consecrated pope by Romanus, who annulled all Stephen's acts as to Formosus.

**STEPHEN VIII.,** succeeded Leo VI., a.d. 928. This was the period when Marozia, and her husband Guido, duke of Tuscany, ruled in Rome. They had put to death pope John X., and are said to have done the same to his successor Leo VI., whose pontificate lasted only seven months. The election of Stephen is supposed therefore to have been affected with their approbation; but we have no historical record concerning the particulars of his pontificate. The tenth century is the truly dark age of Italian history. Stephen VIII., styled by some VII., died in December, 930, and was succeeded by John XI., son of Marozia.

By the death of Stephen VIII., in 931, Rome was then governed by Alberic, son of Marozia, who assumed the title of 'prince and senator of all the Romans.' Little or nothing is known of Stephen IX.'s pontificate. Martinus Florus, a chronicler of dubious authority, says he was roughly handled by the Romans in a popular tumult, and was crippled for the rest of his life. He died a.d. 942, and was succeeded by Martinus III.

**STEPHEN X.,** styled IX. by some, Cardinal Frederec, abbot of Monte Cassino, and brother of Godfrey, duke of Tuscany, succeeded Victor II., a.d. 1057. He had been legate of Leo IX. to the court of Constantinople, and was learned in controversial divinity. His election is said to have been unanimous. By the advice of the monk Hilde- dard, Stephen made an expedition to Milan to enforce the decrees concerning the celibacy of the clergy, which the church of Milan had not yet adopted. This dispute had begun in 1021, at the council of Pavia, and it lasted for nearly half a century. Stephen issued also some canons regarding the summoners of the people. He sent for the learned Petrus Damianus, who had retired to a secluded cloister, and obliged him to come to Rome under pain of excommunication, and made him cardinal bishop of Porto. He then resided for some time at the monastery of Monte Cassino, in which he enforced a strict discipline. He also issued a bull exempting the clergy from the jurisdiction of the lay courts, and from paying tribute to laymen. From some passages of Leo Osiensius and other chroniclers, it has been inferred that Stephen, the person of his death, was succeeded by his brother Godfrey king of Italy. But the pope fell ill,
and died at the beginning of 1058. On his deathbed he recommended the clergy and people to wait for the return of Hildebrand from Germany before they elected his successor, but the advice was not followed, and a schism ensued.

STEPHEN, St., first king of Hungary, son of the Magyar chief Gyeya, and Sarolta, the daughter of Gyula, a Hungarian nobleman who had been baptized in Greece, was born about 979, at Gran (Brigant, the ancient Strigoni).

His father Gyeya (Gyöző, i.e. Victor), whose fierce and indomitable character the Christian Sarolta had succeeded in softening, allowed Pilgrim, bishop of Lorach, to preach the gospel to the Magyars; but these first attempts proved unsuccessful, and the first Christian rituals on their soil were only a semblance, as Gyeya himself was converted, that a few of his countrymen followed his example. The number was however greatly increased upon the arrival in Hungary of St. Adalbert, who advised Géza to allow the Christians to settle there; and in consequence of this procession being granted, a number of Germans and Italians established themselves in the neighbourhood of the capital, Gran. The majority of the Hungarians being however still attached to their gods, persecution as well as other obstacles remained. But the king assisted to them. In the midst of preparations for a powerful attack against his heathen countrymen Gyeya died, and Stephen succeeded him in 997.

The legend says that an angel had announced to Géza the birth of Stephen, the protomartyr, appeared to Sarolta, and bade her call her offspring after him. The name which he bore before his baptism was Váik, according to Malath. Great care was taken by his mother that he should receive a good education; Count Deodatus à San Severino, in Apulia, befriended him, and St. Adalbert, of Prague, baptized him in 995. Shortly after this he married Gisela, the sister of the emperor Otto III.

The dissatisfied Magyars, though they had hitherto refrained from personal attacks on their heathen neighbours, now desired to assert their importance, and enjoyed the powerful protection of Gyeya, now began to make open resistance. The youthful experience of Stephen, who had scarcely assumed the reins of government, seemed to give them hopes of succeeding in their attempts to dethrone the court. On the failure of his attempts, the discontent fell upon his knees and confessed all. Stephen gave a general pardon to all who were concerned in the crime. He died on the 19th of August, 1038 (the day of his coronation), forty-one years after the death of his father. In 1038 his remains were sent to the cathedral of St. Peter which bears his name, in the church of our Lady of Buda. The 20th of August, the day of the translation of his relics, is kept in Hungary as a festival.

St. Stephen was crowned by Benedict IX., and pope Innoceant XI. in 1656. appointed his festival to be kept on the 2nd of September, the emperor Leopold having on that day recovered Buda from the Turks. (Chartulatus Vita S. Stephani.)

STEPHEN II., king of Hungary, son of Koloman, whom he succeeded in 1114, at the age of fourteen. He was of a weak intellect, and unwilling to submit to the judgment of his advisers, but was accustomed to act from the impulse of the moment. This quality gave him the name of 'the Lightning, or the Thunderer,' and rendered him obnoxious to his subjects. Soon after his accession to the throne he made war on the Venetians, who could not be reconciled to the loss of Dalmatia, which had been taken from them by his father. Failing in the renewal of the war with a considerable army, under the Doge Ordelaf Faledro, who however did not recover this province, the possession of which was of the greatest importance to the republic. The hostilities, which lasted two years, ended with a treaty which secured the mainland of Dalmatia to the Venetians, while Venice obtained the adjoining islands. This transaction was scarcely concluded, when Stephen went (1116) to meet Wladislaw, the chief of the Bohemians, for the purpose of renewing the treaties of friendship which had long existed between them. Unfortunately for Stephen, the treachery of an individual whose name was Solth, the meeting terminated in a quarrel attended with bloodshed; but after a few months the traitor was executed, and the old treaty renewed. The taste for war which Stephen inherited from his father was well known for the security which it afforded, that the two English princes Edwin and Edward, who had been expelled by Canute, came over to Hungary and lived under king Stephen's protection. The whole of his attention was given to the firm establishment of Christianity, and no means were neglected by him which could induce the few who still persevered in heathenism to give up their old faith.

He divided Hungary into ten bishoprics, which were plentifully supplied with monasteries built by Greek architects. Schools were also established, the first and best of which was that of St. Gerard, who had been tutor to prince Emerec, the king's son. The king also, on the recommendation of Walter, a monk of Bâkony Bîl, the fifth monastery founded by Stephen. The country itself being now provided with ecclesiastical and school establishments, a monastery was built at Ravenna for the use of Magyar pilgrims, who were too numerous to travel in the retinue of the bishop and to erect a college with a foundation for ten canons, and an inn for his subjects whom the desire of learning might lead to Rome. A large content in the neighbourhood of Constantinople was the resting-place for Hungarian monks who wished to join their brethren at Jerusalem, and who were entirely supported by the king.

These and many other pious and charitable institutions of St. Stephen, joined to his own exemplary life and precepts, soon restored St. Stephen's, or Wagman, his constitution, which is undoubtedly the foundation of the present Hungarian government, but of which we have no well authenticated remains, finished the work of civilization which he had begun thirty years before.

At this period, towards the close of his reign, at the beginning of the 12th century, he became occupied with the recapture of the kingdom of Jerusalem, which, following in the train of his father's efforts, had been lost to the Crusaders by the treachery of a German knight, known as Emmerich, and the triumph of the Albigensians. New wars thus awoke. Aided by the pious and capable monastic leader Adrian, who had been known as the founder of the community at Széchenyi, Stephen, in his last campaign, had环境污染的区域。
This king is sometimes called Stephen IV. by those who do not recognise the usurper of that name.

(Stephenus. Epitome rerum Hungaricarum; Bonnii, Rerum Hungaricarum Decades Quatuor; Maiath, Geschichte der Magyaren.)

STEPHEN, king of England, born A.D. 1105, was the third of the four sons of Stephen, earl of Blois, by Adela, the daughter of Henry, archbishop of Rheims, and by him succeeded to the dukedom of Normandy, which he retained until his death, in 1154. He was a man of great activity and enterprise, and devoted himself to the pursuit of worldly ambition. He was the father of Henry, who succeeded him on the throne of England, and of Matilda, who was the queen of Henry I., king of England, and afterwards the wife of William Rufus, king of England.

The two eldest sons of Stephen were William and Robert, who were both killed in battle before they came of age. The third son, Henry, who succeeded him, was a man of great ability, and was beloved by the people of England for his kindness and humanity. He was succeeded by his brother, who reigned for a short time, and was then succeeded by his nephew, the king of France, Philip Augustus, who was a man of great ability and courage, and was the founder of the famous House of Capet.

The four sons of Stephen, earl of Blois, were:

1. Robert, who was killed in battle before he came of age.
2. William, who was killed in battle.
3. Henry, who succeeded to the throne of England, and was the father of Matilda, who was the queen of Henry I., king of England.
4. Philip, who was the founder of the House of Capet.

The death of Stephen, earl of Blois, occurred in 1106. He was succeeded by his brother, who reigned for a short time, and was then succeeded by his nephew, the king of France, Philip Augustus, who was a man of great ability and courage, and was the founder of the famous House of Capet.

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mably; and, having the next year brought her over to Eng-
lnd, had collected all the chief persons of the time, al-
ong with the archbishops, bishops, and abbots, and that
him at Windsor, there was such a grand Christmas, and, havi-
there by presents and promises engaged those among them
of greatest influence to support his views, he came to Lon-
and, having proposed the matter in a council consisting of
the greatest nobles of the kingdom, it was determined, in the
beginning of January, 1127, though not, says Malmsbury,
without great and long deliberation, the unanimous promise of
the assembly, that, if he should die without male issue, they would receive Matilda as his suc-

eressor. Every individual, in the case of a female issue, was to note—quicunque in codicem conciliu aliquis videtur esse
momentum (to adhere to Malmsbury's remarkable expression)
took a solemn oath to that effect; first the archbishop of Con-

stantinople, and then the archbishops of York, of Scotia on account of the bea he held of the English

rown, then Stephen, earl of Boulogne and Moravia,

and, the earl of Gloucester, then the other barons. 'But
bewitched the earl of Boulogne and the earl of Gloucester,'
says Lord Lyttelton, 'there was a dispute about precedence;
not (as I apprehend) which should be foremost to show his
zeal for Matilda's succession (though that might be the

tence for it), but to determine a question of the greatest

ecessity, and that he should die before the king, namely,
which of the two was nearest to the throne. And its being
now decided in favour of Stephen, on account of the illeg-
nitimacy of his competitor, was of so little service to him after-
wards, even against Matilda herself, as he was thereby
numerically weakened. He now set out of the way of Stephen a very considerable obstacle
to his ambition, by the discouragement it gave in the eye of
the public to the earl of Gloucester's pretensions, who wanted
not precedents, either in England or Normandy, to au-
thorise his aspiring to the throne of his father in default of
lawful issue male. But a solemn determination, which
assigned the precedence to the nephew of the king above
his natural son, was a prejudice of the right of succes-
sion so found in the larger part of Christendom. Matilda was married to Geoffrey Plantagenet, the son of the
earl of Anjou; and in the year 1131, when she was in
England, having already quarrelled with her husband, the
oath of fealty to her was again taken by the bishops and
military at a grand council held at Northampton. And
two years after, on the birth of Matilda's first son Henry,
it was once more renewed, in a council held at Oxford,
both to her and to her son.

Nevertheless, as soon as Henry had expired in Nor-
manty, 1138 Stephen, who, as well as Gloucester, had been for some time in attendance on the
dying king, instantly set out for England, and taking ship at Whitby, near Caith, the usual port of embarkation,
landed on the coast of Scotland, Matilda, hurrying to her
husband's death, her son, to which Henry, having also secured the support of
a powerful faction of the clergy and nobility, by means of
his younger brother Henry, who, having also stood high in
the favour of the late king, had been placed by him in the
bishtery of Winchester, restored the resolution of asserting
over to his brother's interest the most influential subject
in the kingdom, Roger, bishop of Salisbury, who, as grand
justiciary, was the supreme governor of the realm during
the vacancy of the throne. Of Stephen's two eldest
brothers, it may be mentioned that William, his eldest,
was almost an idiot, and that the other, Theobald, had
succeeded to his father's earldom of Blosis; so that Stephen,
in aspiring to the English crown, did not find either of them
in the way with merely enduring, and it was not long
before Henry had also gained for him the support of
William de Pont de l'Arche, who held the castle of Win-
chester and the key of the royal treasures deposited there.
The consequence was, that although Stephen was refused
admission by the inhabitants both at Dover and at Canter-
bury, he was received with warm welcome by those of
London and Winchester; and after Hugh Bigot, earl of
Norfolk, the steward of the royal household, had, to remove
the scruples, real or imaginary, that may have existed,
both sworn that Henry on his deathbed had disinherited
his daughter and her issue, and left the crown to his
nephew, it was resolved by the clergy and nobility who had
gathered about him that he should be crowned forthwith,
and that he should be styled the successor of his
brother on the 26th of December, St. Stephen's day, by
the archbishop of Canterbury, assisted by the bishops of Salis-
bury and Winchester. The commencement of the reign
of Stephen is reckoned from that day.

At his coronation Stephen swore, 1. That on all occasions of episcopal vacancies he would appoint a new prelate within
a certain time, and meanwhile would leave the temporalis-
ties of the see in the charge of some ecclesiastic; 2. That
he would not return to the church after the death of his pre-
cessor, on the contrary, restore to their owners such lands as had
been made forest by his predecessor; 3. That he would
abolish the tax called Danegelt, which, after having been
given up by the Confessor, had been restored by the
Norman kings. Of these things, and the rest of his
oath, nothing like this had taken place at the commencement of any previous
reign since the Conquest.

In January of the following year, 1138, after seeing the
body of the late king interred at Reading, Stephen con-
vened a great council of the bishops and the nobility on
the occasion of the death of the eldest son of the earl of
Northampton, who had been killed in a tournament. In this
council there was a well-known character, Robert of
Bourges, who was known to be the lieutenant of Matilda,
though he had not taken the field. He spoke with
passion on the subject of the crown, and said that
Matilda had been overthrown, not by the hands of the
nation, but by the perfidy of her husband. This
speech was greeted with approbation, but it is probable
that the ears of Stephen were more attentive to the
eloquence of the archbishop of Canterbury than to
the sentiments expressed by Robert of Bourges.
various places of strength were seized upon and garrisoned in her name; elsewhere the barons fortified their castles on their own account, and set up each as an independent chief. Stephen had his bands full of works within this disorder and rebellion in the south, when the king of Scotland again appeared on the northern borders. After having ravaged Northumberland with unusual ferocity in the winter of 1137, David and his half-barbarian host retired before the approach of the English army in May. The beginning of the following year; but as soon as Stephen was recalled to the south, the Scots again crossed the border in the end of March, 1138. They had taken the castle of Norham, still liege, to other castles, when the king's brother, Bishop Roger, archbishop of York, at the head of an army composed of the retainers of the northern English barons, and defeated by him in the famous battle of the Standard, fought on the 22nd of August, 1138, on Cotton Moor, in the neighbourhood of Northallerton. Peace however was not concluded with the Scots till the 9th of April in the following year, when Stephen found himself under the necessity of yielding up to Prince Henry the earldom of Northumberland, with the exception of the forts of Newcastle and Bamborough, for which he engaged to make over to him estates of equivalent value in the south of England.

But by this time the unfortunate English king had found another, more formidable enemy to contend with. He had quarrelled with the church. Resolved to reduce the inordinate power of Roger, bishop of Salisbury, and his two nephews, Alexander and Nigel, bishops of Lincoln and Ely, he had at a council held at Oxford, in June, 1138, arrested his brother Roger; and, on the bishop's escape, he was eventually compelled to surrender his castle of Devizes, as his brother and his uncle had been to give up theirs of Newark, Salisbury, Shrewsbury, and Malmesbury. The inflammation excited in the whole ecclesiastical body by this attack was terrific. Even the kings brother, the bishop of Winchester, who had been lately made papal legate, was either carried away by the general feeling of his order, or, if he did not share in that feeling, found it would be impossible to contradict it. He consented, with his brother, to answer for what he had done before a synod of bishops, which met at Winchester. Stephen complied so far as to send one of his ministers to plead for him, who, when the decision upon a preliminary question had been given against the king, appealed to Rome; on which the legate dissolved the synod, on the 1st of September, 1139. On the last day of the same month Matilda landed on the coast of Suffolk, and immediately after the earl of Gloucester unfurled his standard in the west. The war was carried on with fury over all the country. At length, on the 23rd of February, 1141, Stephen, while besieging the castle of Lincoln, which was held by Ranulph, earl of Chester, was attacked by the earl of Gloucester, and being taken prisoner, was immediately, by Matilda's order, consigned in chains to the castle of Bristol.

On that day month Matilda and her brother, attended by a numerous body of barons of their party, met the legate on the open downs in the neighbourhood of Winchester, when it was solemnly agreed that Henry and the church should acknowledge her as their sovereign, on condition that he should be made her first minister, and especially that all vacant bishoprics and abbeys should be filled up on his nomination. Soon after this the archbishop of Canterbury and all the other bishops gave in their adhesion. In the beginning of April the heads of the church met on the summons of the legate at his episcopal city of Winchester; and there he addressed them in a long speech, which Malmesbury, who heard it, has preserved; and in the end the meeting unanimously agreed to confirm his treaty with Matilda. A remarkable circumstance mentioned in the account of this meeting is the appearance of certain deputies from the monasteries of London and the provinces, numbered on the council of the greater part of the city were considered as nobles in England, and who had been summoned to give their attendance by the legate, although the assembly was otherwise composed only of ecclesiastics. They at first stood out, but were ultimately persuaded to concur with the rest of the meeting.

But the folly, rapacity, and insolence which Matilda now displayed in her triumph, were soon found to be insupportable by all parties. Taking advantage of the strong popular feeling of disgust, Stephen's queen Matilda, who had retained in arms for her husband in the county of Kent, made her appearance before London while the empress lay there awaiting her coronation; and she barely consented, by springing from table and mounting her horse, to effect her escape to Oxford. The legate now joined his sister-in-law and the Londoners; the empress, with the king of Scots, the earl of Gloucester, and others of her principal retainers, besieged in the castle of Winchester, the news that Stephen had sustained a disastrous defeat in the morning of 29th September, when, being immediately pursued, many of the party were killed; most of the rest, including the earl of Gloucester, were taken prisoners, and Matilda herself with her retinue. The Parliament was opened for the taking of a new charter, which was now opened, the result of which was that in the beginning of November Gloucester was exchanged for Stephen. When his brother was thus again at liberty, the legate once more summoned a clerical synod at Westminster, on the 7th of December, at which he defended his abandonment of the cause of Matilda, and as usual carried his brethren along with him in his new course of politics. Stephen himself, having appeared among them, addressed them with pathetic eloquence on the wrongs and indignities he had sustained; and they ended by resolving unanimously to communicate all who should adhere to the 'countess of Anjou.'

The war now recommenced after Stephen had recovered from an illness, and intercepted by reason of the support Gloucester had returned from the Continent, whether he had gone to endeavour to persuade Matilda's husband to come over to her assistance, an attempt in which he met with no success, although Geoffrey consented to entrust his queen to the care of the English king, and afterwards carried her to the castle of Oxford, 1142. Stephen laid siege to the city of Oxford, in which Matilda resided; but when the garrison, from want of provisions, could hold out no longer, the empress, on the 20th of December, in a severe frost, and while the ground was covered with snow, crossed the Thames on ice, rode to Abingdon, and thence rode to Wallingford. Other sieges, battles, and adventures followed, but the most memorable action generally in the eastern counties to Stephen, in the western to Matilda, till the death of the earl of Gloucester, the main support of the latter, in 1146, upon which she retired to Normandy. But her absence brought little more quiet to Stephen. The next two years were disturbed by a formidable rebellion of a confederacy of the barons headed by Ranulf, earl of Chester, and also by another quarrel with the clergy, whose hostility Stephen incurred upon himself this time by his support of their old leader huber. But Hert was sustained; the successor of the unfortunate prelate, whom the pope, at the instigation of Theobald, archbishop of Canterbury, had deprived of his office of legate, sought to avenge himself on the primate by the aid of the English army, entered Aquitaine by his marriage with Eleanor, the divorced wife of Louis VII. of France, landed at Wareham, on the 6th of January, 1153, at the head of a force of only 3000 foot and 140 knights, which however was soon augmented by the junction of considerable numbers of his mother's friends. Yet the sieges and battles, at last published a sentence of interdict, the first of which this country had ever been the object, against all the dominions of the English king; and Stephen, assailed by the cries of the alarmed people, found himself forced to yield.

But his last and worst antagonist now appeared in the person of Matilda's son Henry, who, having by the death of his father, in September, 1151, become earl of Anjou, and having soon after added to his paternal dominions the territories of Poitou and Aquitaine by his marriage with Eleanor, the divorced wife of Louis VII. of France, landed at Wareham, on the 6th of January, 1153, at the head of a force of only 3000 foot and 140 knights, which however was soon augmented by the junction of considerable numbers of his mother's friends. Yet the sieges and battles, at last published a sentence of interdict, the first of which this country had ever been the object, against all the dominions of the English king; and Stephen, assailed by the cries of the alarmed people, found himself forced to yield.

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phrensy, while he sat at table, constituted Henry, whom he wished duke of Normandy, his successor in the kingdom of England. But he did not live to enjoy his time did homage and swore fealty to Stephen; Stephen's surviving son William did homage to Henry, and received from him a grant of all the lands and honours held by his father. The bishops and abbots, the barons and the inhabitants of all the boroughs in the kingdom, swore fealty to both the king and the duke. One of the most strenuous supporters of this arrangement was the bishop of Winchester, who was said to be in private a most ferocious enemy, but who died suddenly in a convent at Dover, on the 25th of October, 1154, being in the 50th year of his age, and having reigned nineteen years all but two months.  

**STEPHEN, BATHORI,** one of the most remarkable individuals of the sixteenth century, and the greatest king that Poland ever had. He was born in 1533, at Shamol in Hungary, of an old and noble family of that country. The national temper of the一阵line continued during the sixteenth century, being torn by domestic factions, and troubled by the Turks and the Austrrians, presented a vast field for the display of great talents, united to a daring and adventurous character, and Stephen Bathori rose after many vicissitudes to the sovereignty of his country. He was elected to the throne of Poland, vacant by the flight of Henry of Valois (Henri III. of France); and he owed this elevation to the renoun of his valour and wisdom, which took possession of the crown; married, according to the conditions of his election, the princess Anna Jagellon, sister to the deceased king Sigismund Augustus; repressed by his vigour the party which supported his competitor Maximilian of Austria; and pacified the country by conciliatory measures. The true test of really great men is the ability of filling the shortest possible space of time with the largest amount of great deeds, and few characters in history may lay a better claim to having fulfilled these conditions than Stephen Bathori.  

After having regulated the internal affairs of the country, he settled its foreign relations in a satisfactory manner, particularly by ensuring the friendship of the sultan of Turkey. He then turned his attention to the work of the Muscovy. This power had recently obtained an extraordinary development under the celebrated Ivan Basilovich, who invaded a part of Livonia belonging to Poland shortly after the accesion of Stephen. His first care was to organise a military force adequate to encounter such a formidable enemy, and to secure at the same time the tranquility of the borders. He formed the Cossacks of the Ukraine into a regular force, allowing them the choice of their own heimman or supreme commander; and conferring on them many advantages as a reward for the services which they were obliged to perform. The castles were repaired and provided with permanent garrisons; a formidable ordnance was created; and a body of life-guards and a regular infantry were organised.  

Having completed his military preparations, he took the field in the summer of 1579 with a numerous army composed of national troops, German mercenaries, and five thousand Hungarians, commanded by Bekesh. The old dragoon of Bathori, had been his enemy and competitor for the throne of Transylvania; but finally, struck with admiration of the superior qualities of Bathori, he disclaimed his enmity, and requested the honour of serving under his command. These requests were granted by Bathori, who placed in his former enemy an unlimited confidence, which Bekesh justified by his services.  

On commencing the campaign, Bathori issued a proclamation to the people of Muscovy, declaring that he was making war against their tyrannical sovereign, and not against them, and promising protection to their lives and property. The Russian historians bear evidence that this promise was strictly fulfilled, and that this campaign was free from all the barbarities which had been committed in those times. The Muscovites were defeated in several battles. Polotzk was taken after a desperate resistance; but the garrison and inhabitants were spared by the conqueror, who immediately granted to the towns the liberties enjoyed by the cities of Poland, and the same privileges and security to the Greek church which it had enjoyed under the dominion of Moscow. Having restored that important to Poland, from which it had been absent several years before, he obtained two other advantages during the same campaign, and returned in the winter to Warsaw to attend the diet, which received him with great enthusiasm, and willingly granted the necessary means for the continuation of the campaign. But Bathori continued it with great vigour in the summer of 1580; the town of Veliki Luk and several others were taken; and in the next year, 1581, the city of Plescow was besieged by Zamorski Piotr, in those of the greatest statesmen and warriors of Poland.  

**P. C. No. 1427.**
produced (Zamovsky), and to whom Bathori had entrusted the command of the army. The Prince of the Polish arms was afeigned, and the fruits of so many triumphs were destroyed, by the intrigue of the Jesuit Possevino, who, de-
ceived by the promises of the czar Ivan Basilovich to
acknowledge the supremacy of the pope, induced Stephen
Bathori to renounce his services to the Holy See. The
Partition of 1582, by which the Polish conquests were restored to the
czar, with the exception of Podolz and a few other towns and
castles. Bathori employed the interval of peace in in-
troducing different improvements, and was making prepa-
rations for another war with Muscovy, the dangers of which
his policy could easily foresee. The pope, Sixtus V.,
deceived by the czar, who as soon as the danger was over
thoug not much about submitting to Rome, granted the
Polish king a very considerable sum of money for a
war against Muscovy, which are supposed to have had
for their object a change in the form of the government of
that country, were cut short by his death, after a short illness
at Grodno, on the 12th December, 1586, at the age of fifty-
four.

The wars in which he was engaged did not prevent
him from paying due attention to the civil affairs of the
country, in which the following improvements were in-
troduced during his reign. The province of Mazovia, which
had been governed by a governor General, was divided into
three districts, by which the territory was divided, and
revised, was avised. Many salutary laws respecting the
property of the crown and the privileges of the nobles
were enacted. But the most important civil act of this
king was the establishment of tribunals or supreme courts
of justice for Poland and Lithuania. They were com-
pised of members selected for the session by the same voters
who returned the nuncios, or members of the diet. This in-
sitution, which supplanted the administration of justice by
the king, and rendered it independent of the crown, con-
tinued the dissolution of Poland. (Poland, Constitu-
tion or.)

Stephen Bathori was very fond of learning and a great
patron of learned men. In his early life he was imprisoned
for two years in a fortress, by the emperor of Austria, which
time he spent in the study of the classics, and particularly
in that of the "Commentaries of Caesar," which he is said
to have known by heart. He is supposed to have been
originally a Protestant, but to have been induced by the
preachers of the Jesuit order to abandon the Lutheran
Church and to become a Roman Catholic on his accession
to the crown of Poland, so that many believe that he had
always conformed to the Roman Catholic Church. Some
learned Jesuits having gained his confidence, he became a
great patron of the school. He encouraged learning, and
increased the knowledge of the language of Wisia and the
college of Podolz, which he richly endowed. He was however
strongly opposed to religious intolerance, and maintained
religious neutrality among the various denominations which prevailed in Poland. He
was of a generous and forgiving disposition, as an instance of
which we may quote the following anecdote:—A noble
called Potonskis, who was a very gallant officer, violently
opposed the king as a nuncio at a diet. It happened that just at that time the grant of an estate was to be made, and
Stephen gave it immediately to Potonskis, saying,
'He is as good a soldier as he is a bad nuncio.'

He left no issue, and resigned, on his election to the
throne of Poland, the principality of Transylvania to his
eldest son, Francis Stephanus.

As a proof of his tolerant spirit and enlightened mind,
we may adduce his favourite saying—"that God has reserved
two things to himself; the creation of something out of
nothing, and the knowledge of futurity, and the government
of the conscience."

STEPHEN (French, ETIENNE or ESTIENNE; Lat., STEPHANUS) is the name of a family of the most illustrious
scholars and printers that has ever appeared. Several
of the members of this family bore the same Christian
name, which has produced much confusion in the accounts
that have been given of them. We shall give the lives of
them in a chronological succession, and distinguish those of
the family by the initials of their Christian names, as
above.

The earliest among them who distinguished himself is
the eldest of the three sons of Henry Stephen of Hungary, who
was born at Paris; the year of
his birth is uncertain, though it is generally supposed that
it was about 1470. He had his printing establishment at
Paris, in a place which he calls 'e regione scholaris decret-
torum,' which is now called 'Rue de l'Ecole de Droit.' The
earliest work which is said to have been printed by him is of
the year 1502, the year before that in which his son Robert
Bathori was born. This was a work consisting of 16mo.
logical, philosophical, mathematical, and medical subjects,
and he published very few editions of the classical writers.

On the title-page of his publications are represented

two men looking at a shield which stands between them, con-

tricted to a hand holding a closed book. Above the heads of the two men is the device—

'Plus olei quam vini.' At the bottom of the title-page he
sometimes gives only its initials, H., and sometimes his
name. He printed his work very correctly printed, as he always revised the proofs.

A list of his publications is given by Maittaire (Historia Ste-
phantorum, ii. 1, p. 1-9, and by Renaudou, vol. i.), from
which we extract the following:—In 1512 he published the
'Imperium Antonini,' in 1519 the works of Domines
Arepogati; in 1521 an extract of the 'Arithmetica' of Boe-
thius. In 1522 his son Robert was engaged in the printing
establishment of his father-in-law Simon de Colines, who
calls himself the successor of Henry Stephen, and this fact
enables us to infer that Henry Stephen
died in 1521 or 1522. He left three sons, Francis,
Robert, and Charles.

FRANCIS STEPHENS I., was the eldest of the three sons
of Henry Stephen, and was prince of Simon de Colines:
there are very few books known to be printed by him.
The earliest is a work called 'Vinitum,' printed in 1537. In
1543 he published a 'Palatium Gregaeum,' in 16mo.,
in which the titles and the initials of the verses are printed
in red. The last of his publications is the 'Testament
Latine,' printed in 1548, in 8vo. His mark on the title-page is a tripod, which stands
upon a book, and from which a vine-branch rises. The
device upon the base is —A. 

But the death of his father, as early as his
nineteenth year, to have had the entire management of the
printing, correcting, and editing of several works, for in 1522
there appeared from the establishment of De
Colines a new edition of the 'Testamentum, Latine, in 16mo.,
which, although a copy of the Vulgate, was more correctly printed than any previous edition, and
also contained some corrections by Robert Stephens.

The following is a list of his works:

1. A new edition of a book which they wished to keep from the
public, especially at a time when Protestantism was making
rapid progress, inveigled in their lectures against the
adversary, and declared that the book should be
burnt. But their anger produced little effect. A short time after
this he married Petronella, a daughter of the celebrated
scholar and printer Jodocus Badius, a woman of great
talents, who understood and spoke Latin as well as her
mother-tongue. As the house of Stephens was very large,
by the most eminent men of Poland, and Latin became
the ordinary language of conversation; and it is said that
the children and even the servants acquired some facility in
speaking it. After his marriage he established a separate
printing-office, of which he was the sole owner, and the
street in which his father’s office was situated. The
earliest publication of his own establishment was 'Apuleii Liber
de Socratis,' 1525, 8vo. Others believe that he had no
separate establishment till two years later, and that his
'Parchment of Socrates' (1527) were the first works that issued from it. These
works were
followed by a great number of Roman authors, and Latin
translations from the Greek and other languages, some
of which were made by himself. For many years after
his death (1572) no new publications appeared, and if we
recollect that in most of the works he acted as editor, and
corrected the proofs with the most anxious care, it appears marvellous that so many works could be produced in so short a time; the mere list of his publications in Maittaire, from 1542 to 1562. I do not think any person, in the entire year 1532, he used the same types as his father, but in this year he used a larger and more elegant type for his 'Biblia Latina,' of which he had published the first edition in 1545, as well as his 'Commentary on the Psalms,' which is still higher, and the 'Institutional Testamentum Latina, ex veteribus MSS. exemplariis emendata.' This edition was not only in appearance the finest that had ever been printed, but that he might be able to give the text with the utmost correctness, he had examined all the libraries of Paris, Ghent, and Brussels, and had got over from Spain at his own expense a very valuable Spanish Bible.

In the year 1531 Stephens published his first great original work: 'Dictiorarium, seu Latinae Linguae Thesauri,' in two volumes, fol., and contained numerous corrections and improvements by Robert Stephens. The work has often been reprinted in other collections.

In the year 1539 Stephens was appointed printer to the king of France for Latin and Hebrew works, and henceforth he always added on the title-page of his publications, to his name, Regius Typographus, or Regius Librarian, or some other title, and to give him the more appearance of the distinctness for Greek works, whom he calls himself sometimes 'Regius Typographus in Graecis.' Stephens appears to have thought that he ought to produce his publications in a form worthy of his new rank, and to give the printer, and to gain the better appearance of the divines of the Sorbonne renewed their attacks, but owing to the king's liberal protection he was enabled to continue his labours un molested. The king had such a high esteem for his learned printer, that he frequently visited him in his office, and, as the occasion arose, when he found him correcting a proof sheet, he stopped behind him and waited silently till Stephens had finished his task, before he began to converse with him. The first Greek book that Stephens printed in the king's name was the secret of the Eucharist, and it was printed the same year, 1540, and bears the title 'Pompeii Montesquieu, sive Sententiae singularis versibus contentae juxta ordinem Literarum ex diversis Poetis, cum Interpret. Latina.' In 1543 he published a little work called 'Alphabetum Graece cum Corinthio,' with a dedication to the king, and it was afterwards frequently reprinted. This is supposed to be the first book that was printed with the Characters Regii. In the following year Stephens edited, in one folio volume, a collection of the most eminent Greek ecclesiastical historians, under the title 'Ecclesiastica Historia Eusebii, Sozra- Theodotii, Theodori, Sozomeni, Evagrii, Graecae.' This work was soon followed by 'Eusebii Praeparatio Evangelicae in Greek. These two volumes contain the earliest specimens of the Greek subjoined to the work adopted by all royal printers in this year, 1540, and bears the title 'Pompeii Montesquieu, sive Sententiae singularis versibus contentae juxta ordinem Literarum ex diversis Poetis, cum Interpret. Latina.' In 1543 he published a little work called 'Alphabetum Graecum, with a dedication to the king, which was afterwards frequently reprinted. This is supposed to be the first book that was printed with the Characters Regii. In the following year Stephens edited, in one folio volume, a collection of the most eminent Greek ecclesiastical historians, under the title 'Ecclesiastica Historia Eusebii, Sozra- Theodotii, Theodori, Sozomeni, Evagrii, Graecae.' This work was soon followed by 'Eusebii Praeparatio Evangelicae in Greek. These two volumes contain the earliest specimens of the Greek edition of the Latin Bible, which he had been preparing for several years. It contains notes which afterwards appeared upon the Stephens' edition. A new edition of the Latin Bible, which had been communicated to Stephens by the pupils of this theologian. But the authorship of the note is a point which, even at the time, appears to have been the subject of much dispute. In the year following he published his new edition of the Hebrew Bible, with a new and excellent type which was a great acquisition to the printers of the time. He made preparations for a step which his enemies did not expect. He finished the numerous works which were at the time going through the press, and that was alone, as the year 1551, or at the beginning of 1552, he escaped with the
his family to Geneva, where he hoped to find that liberty of conscience which he had so long wished for. Stephens was charged by some writers with having taken with him some of the best Greek manuscripts at the expense of the Church; but this is a legend. The virtual printing establishment, but his biographers have shown that there is not a shadow of ground for this charge. There is also a tradition, which does not seem at all improbable, that the professors of the Sorbonne vented their implacable rage by burning Stephens in effigy.

Stephens began his new career at Geneva with the publication of some books of the Old Testament, and of the whole of the New Testament in Latin and French. In 1550 he also published "De Generalibus theologiis, et locis," in Latin, "Dictionarium," 1686. Others but Appiani Traicte "Judeei, at 1557; and Oliva cal ultrices, who had died in 1554, 4to., said to have been written by Calvin, on the whole of his Latin and Greek, and several other scholars, and undoubtedly reformers. He retained his former device, but under it he printed, "Oliva Roberti Stephani." The name of Geneva seldom appears on the title-page of his books. He died on the 13th of Sept. 1559, leaving behind him, it is said, a numerous offspring, for the proper number of his sons is known, Robert II, Henry II, Francis II, and a daughter of the name of Catherine.

There is perhaps no man in modern times to whom literature and science are more indebted than to Robert Stephens. His unbiased contemporaries not only place him on a level with the greatest scholars, but declare that he excelled them all. Charles Stephens appears to have been a year younger than his brother Robert. His education was sound and classical; but he also applied himself to the physical sciences, and took his degree of doctor of medicine, which he practised for some time. He wrote several treatises on subjects connected with medicine, natural history, and agriculture, but the most important are his "Historia plantarum," in which he treated his subjects chiefly in relation to antiquity. His earliest productions are abridgments of works by Lazarus Biafus, such as "De Re Vestari," "De Vasculis," and "De Re Naria," which were published by Robert Stephens in 1535 and 1537. Lazarus Biafus (Lazarus Bafi) engaged Charles Stephens as tutor to his son, and in 1540 took him with his son to Germany, and afterwards to Italy, to which countries he was sent as ambassador of the king of France. In Rome in these parts, he became acquainted with Martinus Juvencis, who in one of his letters (v. 17) speaks of him as a high type. On his return to Paris he appears to have continued the practice of medicine, but in 1551, when Robert removed to Geneva, the whole of his printing establishment, with the exception of the press, was sold to the government of the city, which appears to have been undertaken by Martinus Juvencis, passed into the hands of Charles Stephens, for the edition of "Appiani Alexandrini Historiarum Romanorum Colica, Libyca vel Carthaginensis," or, "Syrac. Parthica, Mithridatica, Cynicus quinque libris distincta," which appeared at Paris in 1551, "Cura et Diligentia Caroli Stephani," is probably the first book which he printed, though it had been prepared or commenced by Robert Stephens. It is a beautiful specimen of typography. There is a French translation of a treatise of Plutarch, called "Traict de la Sainte Vierge," by F. Legrand, which is by some referred to the year 1544, and is supposed to be the first book printed by Charles Stephens; but it probably belongs to the year 1545. Soon after Robert left Paris, Charles appears to have been appointed Royal Printer, for this title is mentioned on his last two publications of the year 1551. Henceforth he continued to be very active in his new sphere till the year 1561, for in these two years there issued from his press 97 works, on a great variety of subjects, some of which he had written himself. Charles Stephens seems to have been a man who knew something of everything, but nothing very well. As a man of letters, "he is called a 'male and a 'male volens homo,' and is charged with unkind conduct towards his nephews, the sons of Robert. But as we hear of no accusations of this kind from any other quarter, the impartiality of the writer may be doubted. Charles Stephens died in the year 1564. Some say that he was persecuted for his religious opinions, and died in prison; others state that he was imprisoned for debt in the Châtelet, and that he remained there for the last three years of his life, during which time he did not know how to bring this misery upon him; for we know that he lost a great deal of his capital in 1557, by the publication of his "Thesaurus Ciceronianus," which was a very expensive undertaking, and which he did not know how to bring to an end.

The last three years of his life no work appeared from his press. He left one daughter of the name of Nicole, who was no less celebrated for her beauty than for her talents and accomplishments.

List of the works which were written or printed by Charles Stephens are given by Maittaire and Renouard. We shall only mention the principal: "De diversa Regulis Juris antiqui, Pandectarum libri quinqueae tum titulus "De Prudencia," et alibi; &c., Lutetiae, 1552, reprinted in 1557; "Dictionarium Latino-Græcorum," 1559, reprinted in 1570, fol.; "Dictionarium Historico ac Poeticium, omnium gentium, hominum, locorum, plurum, aestimum, antiqua recensorem, ad singelas et profassas posteaerumque fabulas intelligendae necessarias vocubula bona ordine completus, cura ac diligentia C. Stephani," Lutetiae, 1553, 4to., "Philo- donus Judaei, de divinis dem occidet orbis liber, Johannes Vavaso, interpretre," 1554, 4vo.; "Praemium Rusticum, in honorem Stephani, cum adaequatis ad philosophiam et moralem variorum et singulorum adhuc noti," 1554, 4to.; "M. Tullii Ciceroi Opera," Paris, 1554, 4 vols. fol.; Caroli Stephani: "Thesaurus Ciceronianus," Paris, 1557. Stephens also compiled a "Dictionarium Historico-Geographico-Poeticium," which was printed after his death at Geneva in 1566, 4to., and was afterwards often reprinted in folio. N. Lloyd edited in 1670 an edition of it at Oxford, and in 1688 another was published in London. All the works of C. Stephens are very beautifully printed.

His father was Robert Stephens, this first Charles, this last Paulus, Marsupius, or Pauius, was the son of Robert and grandson of Henry. He was born at Paris in 1528. Even as a child he showed many extraordinary talents. The numerous engagements of his father did not allow him to spend much time upon the study of the arts. He was however a most extraordinary boy; in his fourteenth year he was sent to the Seminary of Le Mans to be instructed in Greek by Petrus Damaeanus, who was then, next to Budeuas, perhaps the ablest Greek scholar of the time; and who, on account of his intimate friendship with Robert Stephens, took great interest in this pupil. At the age of fifteen Henry also enjoyed the instruction of Jacobus Tusanus (Jacques Toussaint); and subsequently, when this scholar died (1547), that of Adrianus Turnebus, who succeeded Tusanus in the professorship of Greek in the Royal College. Although he had been chiefly instructed in Greek by three men, he did not neglect Latin; for even when a boy he was said to have known by heart the first book of Horace's 'Epistles.' He also studied mathematics; and as soon as he had something of astrology, he conceived a strong wish to be better acquainted with the "magi," and a young friend who entertained the same wish, the two boys began to take lessons. Henry did this without the knowledge of his father; but as the fees were very high, and the father, who thought that his son was taking lessons in mathematics, did not pay more than was necessary for mathematical
lessons, the boy persuaded his mother to make up the deficiency. In this way he wasted much money and time, but he soon found that the facility of these pursuits, and gave them up altogether.

In the year 1546 Robert Stephens thought so highly of printing as a means of obtaining a livelihood, that he prepared himself for a journey to Italy, where he hoped to find employment in the service of some prince. In the following year, he was employed in the service of King Henry VIII, on whose staff he remained until 1555. During this period he was engaged in the preparation and publication of several works, the most important of which was the 'Epitaphia Homericorum Heroum.' He afterwards printed this in the 'Florilegium Epigram. Græc.,' 1566, and also in his Homoeri et Hestodii Certamen,' 1578. At Naples and Venice he examined several MSS. At Rome he was very kindly received by Cardinal Brieul, who committed to him a MS. of Athenaeus, and corrections of several passages in Xenophon, of which he subsequently made use in his edition of Xenophon, 1561. It appears that during his stay at Rome he collected a MS. of the Farnesian library, which was communicated to I. Casaubon, who used them in his edition of Athenaeus (1597). At the same time he made the acquaintance of the most distinguished scholars of the age, such as Giovanni Andrea, the Cardinal Stefano, the Cardinal Maffeo, and many others. On his return, in the year 1549, he brought with him the treasures which he had discovered and collected. This was just at the time when his father was finishing his folio edition of the Greek Testament, for which Henry VIII gave a sum of money, which was prefixed to it. About the same time he wrote notes and arguments for the edition of Horace, which Robert Stephens published in 1549. In 1550 Henry Stephens set out on a journey to England, where he was kindly received by Edward VI. His stay was not long, but he appears to have paid great attention to everything that came in his way, and turned it to good account. He himself mentions some interesting circumstances connected with his visit to England in his Apologia pro Herodoto; and in the preface to his edition of the 'Poeti Heroici Graeci.' On his return from England he visited Flanders, Brabant, and the university of Louvain (Loewen). It was at Louvain, as it appears, that he met with a Greek Anthology in MS. which, although Henry VIII was never able to restore the MS., was preserved to his memory. During his stay in the Netherlands, he made himself master of the Spanish language. On his return to Paris towards the end of the year 1551 his father was preparing to quit France, and it is not improbable that Henry accompanied him to Geneva. This is however not quite certain, for in 1554 we find him at Paris, where he published the Editio princeps of Ascreon, in 4to., with a Latin translation and notes by himself. Whether at this time he had a printing establishment of his own, or whether he had his book in that of his uncle Charles, is uncertain, although the latter is more probable, for in the same year he published 'Dionysii Halicarnasii Responsio ad Cr. Pompeii Epistolam,' &c., the title-page of which expressly states that it was printed by Charles. Henry, who had a great share in the business belonging to Henry Stephens occurs towards the end of the year 1555, when 'Davidis Psalmi aliquot Latino Carmine expressi & Quatuor Illustribus Poetis, quo Quatuor Regiones, Gallias, Italiam, Germaniam, Scotia, generaliter,' &c., appeared, with the addition, 'Ex officina Henrici Stephensii.' Towards the end of the year 1554 he made a second journey to Italy, and discovered at Rome a considerable part of the histori- cal work of Diodorus Siculus, which had not then been printed, from which he printed the first folio of his 'Historiae,' 1559. In 1555 he went from Rome to Naples in search of something which appears to have been of importance to the king of France, and to his ambassador at Venice, Odet de Selve, but it is not stated what the object of his search was. The king of France was engaged at war with the emperor Charles V. brought H. Stephens into great danger at Naples, for he was here discovered by some Italian who had met him at Venice in the house of the French ambassador, and when Stephens was on the point of being taken he was sent to Rome to effect upon his being an Italian, and he spoke the language so well that the Italian was at first persuaded, and let him go. On his return to Venice he rendered an account of his mis- take, and it was found that the emperor had been pleased with the manner in which he had executed his instructions. At Venice Stephens made a collaboration of a MS. of Diogenes Laertius in the library of St. Mark, which had originally belonged to Cardinal Bessarion, and which he used for his edition of Diogenes Laertius, which was published in the year 1561, of a MS. of Xenophon, on which he made use of in the edition of 1561.

During the year 1557, when Stephens was in the full possession of a printing establishment, he published seven new works, some of which had never been printed before: among them are the Editio princeps of 'Theoricae Philo- sosphi Platonici, Sermo, sine Disputatione XXI. Græco, nunc princeps edita,' with a Latin translation; &c., with notes by P. Victorius and H. Stephens; 'Ex Cletis, Agatharchides, Mennone exsectoria Historia; Appiani Iberica. Item, de Gentiss Annibalis; Græca, Omnia nunc princeps edita, cum H. Stephani Castigationibus;' and 'Ciceronianum Lexicon Graeco-Latinum.' &c. Henry Stephens accepted the emblem (an olive-tree) and the device of his father, 'noli me tangere,' which was afterwards changed into 'noli metuere,' and after the year 1557 he found himself in great difficulties, but he was assisted by Ulrich Fugger, a wealthy merchant of Augsburg, who, besides a large sum which he gave or advanced to him, gave him another MS. of the Homeric poems, with the which he was pro- foundly grateful for this munificent liberality, henceforth called himself Typographus Huldrici Fuggeri, or Fuggerorum Typographus, which appears on most of his publications down to the year 1568. The Fuggers assisted Stephens in other respects: they had an excellent library and some valuable MSS., which they allowed him to use for his editions of antient works, as in that of 'Imperatorum Justiniani, Justinii, Leonis, Novellæ Constitutiones;' &c., Græcæ, the only work that he edited in the year 1558. After a series of years the Augsburg merchants appear to have become tired of supporting the great printer. In a collection of letters of Stephens, published by Passow in 1830, there are some which show that Stephens wanted them to remove the Fuggers from under their control, and that at length after much correspondence they did not keep their promise. In consequence of this his connection with the Fuggers ceased in 1576.

In the year 1558 H. Stephens published his edition of Diodorus Siculus in fol., in which ten books of this historian were printed for the first time. The MS. which he used for this edition is now in the public library of Geneva. Other publications of this year are, 'Appiani Hispance et Annibalis,' with a Latin translation by Beraldius, in 8vo., and 'Gentium et Familiarum Romanarum Stemmate,' &c., in fol. In this year his father Robert died at Geneva, and Henry was appointed executor of his will, in which he was enjoined to take care of his brothers. Robert, one of his brothers, had been, as it appears, disinherited by the father because he would not abandon the Roman Catholic faith and follow his father to Geneva. Accordingly the printing establishment of Robert, the father, came into the hands of the younger brother, who published the 'Historia de S. Paullo,' and several editions of the Bible. H. Stephens appears now to have given up his establishment at Paris, and to have devoted himself to the management of that at Geneva. In the year 1555 H. Stephens was still in feme, but in 1564 or 1565 he himself states that his wife died. He afterwards married again, for the letters published by Passow show that about the year 1591 he became a widower a second time. On his death in 1598, he left a wife surviving, and to her he bequeathed all his landed property. Of his three wives he had altogether 14 children, ten of whom died at an early age.

In 1560 he published a collection of the lyric poets of Greece with a Latin translation and notes by himself. This was now reprinted. In the year following appeared his edition of Xenophon in fol., for which he had collated a great number of MSS., and to which he added a commentary and
a Latin translation. An improved edition was published in 1581. During the last two years H. Stephens was in bad health and subject to melancholy, arising from over-exertion and the heavy labors of his father's death. In this state he scarcely worked at all; he almost conceived a disgust for literary occupations, and could not bear the sight of a book. But the renewed activity into which he was drawn unconsciously in 1582, restored his health, and he executed, during the first part of 1583, a Latin translation of 'Sexti Philosophi Pyrrhonismi Hypotyposeon Libri Tres.' The Greek original of this work was not printed until 1621. It must have been soon after his recovery that Stephens began the preparation of the Thesaurus Græce Lingum ab Henrico Stephanus constructus. In quo præcipe quæmque primæ partis (paternse Thesaurus Latino Diligentiae seminalis) Vocabula in certis Classibus distributa, multiplice Derivationum Serie ad Primogenia tanquam ad Radices unde pullulant revocata, with the appendix and index, was printed in 1585. This was an attempt to do in Greek, with the aid of the history of Greek philology, as well as in the life of the author, who had embarked in it nearly all his property. The price of this prodigious work was necessarily high, and accordingly it could not have many purchasers. So Scapula some years afterwards published his cheap abridgment (Scapula), the sale was nearly stopped, and Stephens became involved in great difficulties. It has been supposed by some that Stephens soon after published a second edition of his Thesaurus, but this opinion has merely arisen from the appearance of a later edition, with a number of additions, and inserted new ones in their place. In 1572 Daniel Scott published, in 2 vols. fol., 'Appendix ad The- saurum ab H. Stephano constructum.' A new edition of the Thesaurus was published in London (1515-1516) in 7 vols. fol. The number of the previous edition has never been increased by the value of the new. A new edition is now in course of publication at Paris, which is edited by Hase, and L. and W. Dindorf.

It appears to have been owing to the pecuniary difficulties in which Stephens was involved after the publication of his Thesaurus, that, in order to divert his mind, he made various excursions in France and Germany, but he always took the opportunity of exploring libraries and comparing MSS., and thus collected vast quantities of materials for works which he was publishing or projecting. In 1573 he published an edition of all the extant works of M. Terentius Varro in 8vo, and a collection of the fragments of the philosophical poets of Greece. The year following he produced an excellent edition of the works of Apollodorus, with the antient scholia and a commentary by himself. In 1575 there appeared his collection of the Greek orators, some of which are accompanied by a Latin translation; and Arrian's 'Expedition Asiae,' with a Latin translation. In 1576 he published, among other books, an edition of Cicero's 'Epistolae ad Familiares,' in 2 vols. 8vo.; the second volume contains the commentaries of P. Manutius, Laberius, Siganus, Cæsar, and of Stephens himself. In the year 1579 he published another magnificent edition of the Latin poets, in 3 vols. fol.; and in the same year he wrote a little French work, 'Deux Dialogues du Nouveau Langage François, Italianis et autrement desguizé, principalement entre les Courtois de ce Tems,' &c. (printed without name and date). This was an attack upon the fashion, very common at the time, of introducing Italian words into French. Stephens, after the MS. he had received the 'imprimatur' from the state council of Geneva, had taken the liberty of making some additions, for which he was severely reprimanded by the council. Not thinking himself quite safe, or wishing to escape the annoyance to which this affair subjected him, he went, towards the end of 1578, to Paris.

During the stay which H. Stephens had made at Paris in 1579, he had a conversation with the king, in which he expatiated very ingeniously on the superiority of the French language over other modern tongues; and the king, delighted with this eloquence on the French language, persuaded him to write a book on the subject. This book was published in the course of the same year, 'De la Précérence du Langage Français,' Paris, 1579, 8vo. The king, pleased with the success his author had met with, caused a splendid edition of it to be printed from the public treasury, and also granted him an annual pension of 300 francs; but from the manner in which Stephens (in his 'Muse Principum Monitrux') speaks of this affair, it appears that he never received anything at all, for the traversal he has made of the great men of that time, and the much more consequence in such matters than the king.

In 1581 Stephens published 'Juris Civilis Fontes et Rivi,' &c., in 8vo.; and, as is commonly supposed, also 'Sigonius Fasti Consolares.' The latter he printed without the sanction of the Council of Geneva, and was imprisoned and fined 23 thalers. This edition of the 'Fasti' of Siginus, if it was really published by Stephens, must have been suppressed, for there is no trace of it now. H. Stephens spen the year 1578 and 1579 at Geneva, and again in 1579 at Paris. He remained there, and had separate printing establishments in these places. He often resolved to give up this wandering life, and was seriously exhorted by his friends to attend to his business; but the charms of a court life and the habit of travelling had now become strong, and he was dazzled by splendour and deceived by the hopes which he placed in the great. The years 1588 and 1589 he appears however to have spent at Geneva, and several works again issued from his press; but in 1590 a new edict of the State council of Geneva, to the year 1590 by H. Stephens.

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which were publicly sold and fetched low prices, were sufficient to pay his creditors, and to leave something for his wife and children. Stephens died without a will; and Caubon, who went to Geneva to receive his wife's dowry, which was but little owing, together with her share of the inheritance, was generous enough to leave Henry's library, MSS., and printing establishment, in the hands of his son Paul.

There is no scholar to whom the Greek language and literature is under greater obligations than it is to Henry Stephens. He knew his superiority, and sometimes showed that he felt it. The number of books which he printed, edited, or wrote, is immense; and it is truly astonishing that he could have produced so many works during his short period of life. About twenty years after he was continuously producing new works. During the earlier part of his life he was a man of inflexible resolution, and never rested till he had effected his purpose; and he was always planning something, even to the last days of his life. He has often been censured for his alteration of passages in ancient writers without being supported by the authority of MSS., and without even assigning a reason for his alterations. This has been said more especially in regard to his edition of Plutarch, which came out in the same year that he published his Criticorum and other works. He point out several MSS. for his own edition, found that H. Stephens was in most cases supported by MS. authority.

Robert Stephens ii., the youngest son of Robert Stephens, was born in Lyons in 1530. The first time that we find him taking part in the publication of a work was in 1556, when he and Morel, who was then royal printer, published the edition of Anacreon prepared by H. Stephens. The title of royal printer was a title of honor, and the work was probably printed, at least, for the use of the king. Stephens published some books printed by him in this year, at the same time that he came into possession of the printing-office of Charles Stephens. In this office he continued till his death. In security and accurate and beautiful printing of his works he was surpassed by none of his contemporaries. As a printer he was in constant employment in printing edicts and ordinances, as may be seen from the list of his publications by Remourd. He died in 1571. Among his publications we only mention the following: a reprint of the Historical Dictionary ('Dictionarium Propriorum Nominorum Virorum, Malierum, Populorum, &c.') of Charles Stephens, 1560, 4to.; "Josephi Scaligeri Conjectanae in M. Terent. Varro- nera,' 1565; and several editions of Donatus 'De Partibus Orisaniae.'

After his death his wife married again, and kept up the printing establishment. There are publications down to the year 1588, "Ex officina Roberti Stephensii.

Robert Stephens iii., son of Robert Stephens ii., was educated at Geneva and Lyons, where he went to print a few books which inspired him with a love for poetry, and with whom he appears to have stayed at least till 1584. He did not commence printing till 1606, so that eighteen years elapsed without a publication from his own press. His first book was "D. Gregoriu Nysseni ad Eustathiam, Ambrosiam, Basiliam, Epistola, Graecor." I. Caubonius unum primum publicavit, Latinet vertit et notis illustravit," Lutetia, 1616, 8vo. He probably worked in the printing establishment which had belonged to his father, and continued to print until 1631. He distinguished himself also by his Latin, Greek, and French verses, and by a French translation of the first two books of Aristotle's 'Rhetorique,' which was printed in 1630, 8vo. In his poems he generally showed an admiration for the works of R. F. R. N., that is, Robert Filius, Robert Nepos, to distinguish himself from his father and grandfather. He printed a great number of books: the principal are, "Menadou et Philistionis Sententiae Comparatione, Graecor, ex Bibliothecis Regis; cum notis, cura N. Rigaltii," Lutetia, 1613, 8vo.; "D. Junii Juvenalis Satyramus Libri vi., Sulpeimn Satyra, Cura Rigaltii," &c., Lutetia, 1616; "Diets Crotenisi, De Bello Trejano, et Dares Phrygii De Excidio Troyj," &c., 1618, 16mo.

The sons of the Stephens family of the name of Robert, but none of them were distinguished. During the last century there was a French writer of the name of Robert Stephens (Robert Etienne), who claimed a descent from the illustrious family of printing in the world of Henry Stephens i., by his wife, born in Geneva in 1566. He received his early education at home, and was then sent out by his father to visit the principal towns of Europe, and the distinguished scholars with whom his father was acquainted. Lipsius, whom he visited at Leyden, was much pleased with him, and in one of his letters calls him 'mitis adolescents.' On his return to Geneva he assisted his father in printing and editing. He afterwards made several other journeys, partly perhaps in connection with the business of his father. In 1594 he spent some time in London, where, among other distinguished men, he made the acquaintance of John Castel, in 1595, he was at Heidelberg, and in 1606 at Frankfort, where he stayed with the jurist Dionysius Gothofredus. He had married in 1589, his first literary production was, 'Pauli Stephani Versiones Epigrammatum Graecorum Anthologiae, Latini versus,' published in Geneva, 1600, 4to. His works are a series of Latin verses, but his poetry is stiff and unanimated. His best is perhaps the poem on the death of his father.

After the death of his father, when the affairs of the family were settled, and Caubon had left Geneva, Paul was placed at the head of his father's printing establishment (1599), which he conducted with great energy. He first reprinted a number of classical authors which had been edited by his father, and were then out of print, such as Virgil, Horace, the letters of Fliny, and the Latin panegyrics. He afterwards assisted his father in various works. He translated a number of the Greek works of the "Moralis" of Plutarch, 1582-2, 2 vols. fol. After this time he gave up printing and settled in Normandy, and we hear no more about him.

Anthony Stephens, son of Paul Stephens, was born at Geneva in 1599. He studied at Lyons, and afterwards finished his education at Paris, where he submitted Protestantism before Cardinal de Perron. In 1612 he obtained letters patent of naturalization in France, and at the same time the office of huisier de l'assemblee du clergue, with an annual salary of 300 francs. He was engaged in the printing business for a long time after this, but his accounts have not been preserved, and he appears to have been owing to his want of capital. The first work which is known to have been published by him was "Anthonii Stephensii Opera," issued from his press till 1626, when he published a fifth edition of the lyric Greek poets: "Pindari et ceterorum Oe. Lyr. Carminum," this was his last publication. The activity in his establishment during the last years appears to have been very considerable, and we may perhaps also attribute the fact that most of his works are printed on very bad paper. In 1626 or 1627 he sold his whole establishment to the brothers Cloutet. It is not known what became of him after this, and the time of his death is also unknown. He had eight children, two of whom only, Anthony and Joseph, survived their father. Francis Stephens ii., son of Robert Stephens i., and an elder brother of Henry Stephens ii., followed his father to Geneva, and is said to have been a good Greek and Latin scholar. After the death of his father he established at Geneva a printing-office of his own, which he conducted from 1562 to 1582, with an interruption however of nearly ten years. Even during the remaining ten years he printed a number of valuable works, which show that he was one of the most distinguished men of his time. When he died, in 1664, he left behind him a large number of MSS. and valuable books. Among them there are several valuable editions of ancient authors, such as Caubon's edition of Strabo, 1620; of Plutarch's Works, with Xylander's translation, 1624, 2 vols. fol.; Leun-

Nearly forty years after the death of his patron Anthony was in very straitened circumstances, and was supported by his son Henry, who, from the year 1646, had a printing-office of his own, where, among other works, Montaigne's Essays were printed. When this son died in 1661, Anthony married the widow of his last printer, but soon after he became bankrupt. In this state he dragged on a wretched existence until the year 1674, when he died in the Hotel-Dieu at Paris, at the age of 82. He had had six children, all of whom died before him.

Besides the members of the Stephens family, whom we have mentioned above, there are two more, who however were never engaged in printing. The one is Henry Stephens, a son of Anthony, who was made a Gentleman of the bedchamber; the other likewise called Henry, and a son of the former, acquired some reputation as a poet, and also wrote some other works in French.


This last work contains in the first volume a very complete list of the editions of the Stephens, and various interesting and important facts, derived from the public records of Paris and Geneva, which were unknown to former biographers.

STEPNEY. [Middlesex.]

STEPNEY, GEORGE, descended from an ancient family in Pembroke-shire, was born in the city of Westminster, in 1663. In 1676 he was sent to Westminster School, where he continued his studies till 1692, when he entered Pembroke College, Cambridge, where he distinguished himself in 1693 by a Latin ode on the marriage of the Princess Anne to Prince George of Denmark. He took the degree of M.A. in 1699. At Westminster he had formed a friendship with Charles Montagu, afterwards earl of Halifax, which was continued at Cambridge. They came to London together, and were both introduced into public life by the Earl of Dorset.

Stepney's life, which was short, was spent chiefly in diplomatic service. In 1692 he was sent as envoy to the elector of Brandenburg; in 1692, to the English court at Hanover; in 1694, to the elector of Saxony. In 1696 he published a poem, dedicated to the memory of Queen Mary; in 1696 he went as envoy to the electors of Ments and Cologne, and returned from the latter to London, to Generals. In 1699 to the king of Poland, in 1701 to the Emperor, and in 1706 to the States-General. He was made one of the Commissioners of Trade in 1697. He died at Chiswick in 1707, and was buried in Westminster Abbey.

Stepney's poems are few, and of little value. He was one of the 'eminent hands' who were united with Dryden in the translation of Juvenal in 1693. Johnson says 'he is a very licentious translator, and does not recollect the neglect of his author by beauties of his own.'

(Johnson's Lives of the Poets; Soc.)

STEPPE. [Plain.]

STERICORARIUS. [Larid, vol. xiii., p. 336.]

STERICULIA, a genus of plants which gives its name to the natural family of Sterculiaceae, which sometimes forms a section of the family of Bittneraceae. The name is derived from stercula, as that from ster cus, some of the species being remarkable for the strong and disagreeable odor of their leaves or flowers. The genus is characterised by having polygamy in the separation of its sepals and petals. Calyx 5-lobed, somewhat concave. Petals wanting. Stamens monadelphous, disposed in a short sessile or stipitate urceolus. Anthers adnate, ten, fifteen, twenty, in one or two rows; stigmas 2, or nearly aggregate, urceolate or sessile. Carpels follicular, five, or fewer from their abortion, in one, celled, one or many seeded, opening on the inner side; seeds disposed in two rows along the suture of the carpels; sometimes, when the carpels have opened and become spread out, the seeds appear to be arranged along the sides of a leaf-like membran. Seeds with fleshy albumen, and flat, leafy, oval cotyledons. The species consist of various-sized trees with soft timber, which are found in the tropical parts of the world, with many deciduous leaves and axillary panicles or racemes of flowers. Many of them are of considerable use in the countries where they are indigenous. Like the family to which they belong, several species are mucilaginous; and others yield fibre, which, from its tenacity and durability, is used for rope, etc. Some yield aummy exudation resembling tragacanth, and which is sometimes substituted for it, thus the gum called tragacanth, which is sometimes imported from Sierra Leone, is said by Dr. Lind- ley to be derived from a species which he calls S. Tragacantha, the S. pubescens of others. So Dr. Roxburgh states kuteera gum, which is often substituted for tragacanth, to be produced by S. urens, a tree of the mountains of the Coromandel Coast. Dr. Royse however states that the kuteera gum is a name given to a species of the genus Sterculia.

G. Murr. states that the name of Sterculia is derived from the Sanscrit, kuteera, a bark, from which the natives of Malabar prepare flax-like fibres, of which the natives of Wyndam make a sort of clothing. S. acuminata is a native of the tropical parts of the western coast of Africa, where its seeds are everywhere known by the name of col or cola, and are mentioned by most travellers. They are much esteemed by the natives, who take a portion of one of them before each of their meals, as they believe that these seeds increase the appetite and induce flatulence, by promoting the digestion of the food. They are said to increase the size of a pigeon's egg, are bitter in taste, and may be supposed to have some stomachic properties. The seeds of S. macrocarpa and of S. heterophylla are also called cola on the African coast. In Asia, in the same manner, the natives of the island of B. Balanghau, are described by Rumphius as being roasted and eaten by the natives of Ambon, while the capsules are burned for the preparation of the colouring-matter called castorouba. The seeds of S. urens and of S. florinda are likewise eaten in India after having been roasted, as are those of S. Chicia in B. Borneo. The latter is also said to be used as a cheap substitute for opium in the district of Silhet; but this statement, implying the presence of narcotic principles, requires careful examination before it can be considered as a fact, be we generally find an accordance rather than so great a difference in the properties of the species of the same genus.

STERCULIAE, E, a natural order of plants belonging to the syncarpous group of polypetalous Exogen. The plants belonging to this order are trees or shrubs, with alternate, stipulate, simple, often toothed leaves, with a variable inflorescence, and a stellate pubescence. The calyx is either naked or surrounded with an involucre, consisting of 5 sepals, with a valvar or nearly valvar aestivation; 5 petals, valvate, with a valvar or nearly valvar aestivation; 4 stamens, monadelphous, alternate or opposite, with a floral disk; ovary sessile, unilocular, or lunule, or more rarely, trilocular, or more rarely, trilocular, with a locule of indefinite number, and monadelphous; anthers 2-celled; the pistil consists of 5 carpels, often surrounding a columnar gynophore; fruit a capsule with 3 or 5 cells; seeds often winged, sometimes woolly; albumen oily or fleshy, and either adhering to the fleshy styles either flat and plaited, or rolled round the plume.

The order thus defined includes several groups of plants, which have by many writers been made to form distinct orders. Sterculiaceae are most nearly allied to Malvaceae, from which they differ in the possession of 2-celled anthers. From Dipterocarpe and Tiliaceae, to which they are allied by the valvate aestivation of the calyx, they differ in the possession of monadelphous stamens. The subdivisions of this order are marked by very evident peculiarities of structure.

Helicterea have an irregular calyx and corolla. Sterculia, no petals, and definite stamens placed at the end of a long column. Bombacace, a calyx with a ruptile dehiscence, usually woolly, and the cells of the anthers infracture. Bombiace, a part of the stamens sterile and flat, well-formed petals. Bittneraceae, a part of the stamens sterile, and small petals bagged by the leaves. Lasiopetalae, a petaloid calyx and rudimentary petal. Hermanniace, spirally twisted petals with only 5 stamens, and those opposite the petals. Sterculiaceae are natives of India, New Holland, the Cape of Good Hope, and the West Indies. Most of its subdivisions have however a very definite geographical range. Sterculiaceae are found in India and equinoctial Africa. The genus Sterculia contains many species that are used as food or medicine. (Sterculia.)
Bittersines are principally natives of South America and the West Indies; about one-seventh of the species are found in the East Indies, and the same proportion in New Holland. To this group belongs the plant that produces the cocoa [Theobroma] of commerce. These plants, like the whole of the order and its allies, abound with mucilage, and are often used in medicine as demulcents. The fruit of Guayusa salmifolia possesses a mucilaginous pulp, and is eaten in Mexico by man, but principally employed for feeding cattle. The bark of this plant is bitter, and is said to be serviceable in the horrible disease called Elephantiasis.

Hermannia—two-thirds are found at the Cape of Good Hope; the remainder are natives of the East and West Indies, South America, and the islands of the Pacific. The species of Waltheria abound in mucilage, and are used in medicine as demulcents.

Dombeyas are all African, East Indian, or South American. Their properties are similar to the preceding. One of the species, Wollickia spectabilis, forms a handsome tree, approaching the linden, and points out a relation between this order and Tiliaceae.

Lasiosporeae are found entirely in New Holland, and possess no remarkable properties. For further information on the properties of plants of this order see Bombacaceae, Adamsonia, Sterculia, Theobroma.

STEREOGRAPHIC. This word, which is derived from stereos, 'solid,' and graphein, 'to draw,' and which therefore ought to be applied to every method of representing a solid in a plane, has nevertheless a limited technical sense, being applied to that projection of a sphere on which the eye is at a point in the sphere, and the plane of projection is the great circle of the eye which is at the pole, or a plane parallel to it. This mode of projection was known to Hipparchus, and was first described in the work on the planet-sphere attributed to Ptolemy.

The stereographic projection has two remarkable properties. The first is, that all circles are projected either into straight lines or circles. Those which pass through the eye are of course projected into straight lines; in every other case the projection is the subcontrary section of a cone, which has its vertex at the eye, and the circle to be projected for its base; consequently the projection is a circle. As much of the circle as lies below the plane of projection (the eye being considered as above it) is projected inside the great circle on which projection is made; and all the rest outside: when this projection is employed in making maps, it is usual to refer the globe to be projected below the plane of projection.

The second property is, that the angle made by two circles which meet on the globe, is equal to the angle made at the eye of the two circles on the plane of projection. Hence the two circles of intersection of those circles, the angle made by two intersecting circles on the globe being always that made by their tangents. This property is easily proved as follows: Draw through the point of intersection of the two circles (A and B) which are to be projected, two other circles (A' and B'), which have the same tangents, and pass through the eye. Then the tangents of A' and B' at the eye make the same angle as those at the other point of intersection; that is, as the tangents of A and B at the point to be projected. But these tangents of A' and B' at the eye are parallel to the projections of the tangents of A and B at the point to be projected: whence the projections of these tangents of A and B make the same angle as the tangents themselves.

The first property was known to Hipparchus and Ptolemy: the history of the second is rather curious. The first writer who seems to have looked attentively for a discoverer was Delambre (Mem. Inst., vol. v., p. 393), who could not find it in Clavius, Stoeffler, or any of the writers of the middle ages, who have treated pretty voluminously of the astrolabe, which word, as used by them, merely meant a stereographic projection. That it was mentioned (without demonstration) in the French Mathematical Dictionary of Savre's (1752), in an article which was copied word for word into the Encyclopédie, was all that Delambre could say of its origin. He afterwards, in writing his History of Astronomy in the Middle Ages, found the proposition demonstrated in the 'Compleat System of Astronomy,' by Charies Leadbetter, London, 1726; but judging from the rest of the work, he presumes that Leadbetter could not have been the discoverer. No claim however has been put in for any one else, and we think it somewhat of an additional presumption in favour of Leadbetter that Savre's article, which, appearing in the Encyclopédie, first called general attention to the property, can be traced to Leadbetter's work nearly. For we find that Savre's translated his article, word for word, from the second edition (1743) of Stone's Mathematical Dictionary. Stone was a contemporary of Leadbetter and it is not improbable that he refers to his writings. In any case, however, until another inventor can be shown, the last-named mathematician must not be deprived of his right because he does not appear to have done other things as remarkable as this one.

The consequence of Leadbetter's theorem is, that any small portion of the sphere is projected into a figure very nearly similar to itself, so that any not very large portion of the earth preserves its figure with tolerable accuracy in the map. Hence some writers have said that there is no distortion in the stereographic projection, which is not absolutely true, though nearly so of countries which bear no greater proportion to the whole earth than most of them.

The mode of laying down the stereographic projection, which we cannot here give at length, may be found in the memoir of Delambre above cited, in the work on Practical Geometry published by the Society for the Diffusion of Useful Knowledge, or in any work on the construction of maps.

After correcting the proof of the preceding, we had occasion to consult the third edition of Dr. Harris's 'Lexicon Technicum' (1716); and feeling sure, with regard to that work, that such a proposition as the one called Leadbetter's could be stated, we knew it would be turned, if it were then known, that there was an article 'Spherical Geometry,' and there we found it, with a demonstration, enunciated as follows:--All Angles made by Circles on the Superficies of the Sphere are equal to those made by their Representatives on the Plane of the Projection. The.claim that Leadbetter is the discoverer of this, overthrown in the preface, Harris says that under (among others) 'Spherical Geometry' will be found entire treatises, which if he mistakes not, are as short and plain as any extant. If this proposition had been new, he would probably have
noted it here, particularly if it had been his own. We find, however, finally, that the property was lately shown (Encyc. Brit., 'Projection') to have been demonstrated by Halley in No. 219 of the 'Philosophical Transactions,' and is attributed by him to De Moivre or Hook.

STEREO TYPE.

The art of stereotype printing is the printing from cast plates of type-metal in lieu of movable letters or types, and derives its name from the Greek στερεός, firm or fixed, and ρυγικός, a figure or type. This art is a remarkable illustration of the redundancy of some inventions to return, after a long course of improvement, very near to their original simplicity. In the commencement of the art of printing, solid blocks of wood were used, containing, in one piece, all the words of the page was composed. A great improvement upon this plan was the use of single letters or types, which might be combined into words and pages, and, after being printed from, might be distributed and re-arranged for another work. Then followed the process of type-founding, or casting the letters individually in moulds, by which they might be multiplied with facility, and, being engraved originally upon steel punches, might be executed with greater neatness. Whether the early printers employed logotypes, that is, types for printing whole slogans or words, or a mixture of these, is not very certain; but it is well known that many persons have proposed, since the introduction of movable types, the use of such logotypes for the purpose of facilitating the operation. While others have adopted processes which approach more nearly to the old plan of printing from page-blocks, either by fusing the types composing a page into a solid mass, or, as in the modern art of stereotyping, by taking a mould from the page or form of movable types, and using it as a resist for the subsequent mould of brass, into which small screws might pass to secure the stereotype plates; the screws being fastened by nuts on the under side of the brass mounts. In order to bed the plates as evenly as possible, the mount was first heated, and then placed in a press between the plate and the mount. In the latter case the thickness and level were adjusted by placing the back or under side of the wood, and in the former by warming the mount, and then placing it, with the plate, into a press. An account of the experiments of Tillich and Foulis was published in the tenth volume of the 'Philosophical Magazine.' Satisfactory as they were, they did not immediately lead to the adoption of stereotype works which were then tried.

Towards the latter end of the eighteenth century, many projects were brought forward in France for multiplying engraved blocks or forms of type by processes more or less resembling that of stereotyping, under the names of polyg, polytype, polytype et de sterétotypie, which were contained in that work is derived from the volume before mentioned.

One of the earliest schemes which claims notice in this brief sketch is that which was tried at the beginning of the last century by a Dutchman named Steffens. The booksellers Luchtmans, of Leyden, in a letter dated 1601, which was printed by M. Camus, in his Histoire et Procede du Polytype et de la Stereotypie, described some plates or blocks formed by Steffens, which had been used in their establishment ever since 1711. These were the forms for a quarto Bible; but a few other works were executed in the same way. They were not cast solid, but consisted of ordinary types, which, after being set up in the usual way, were converted into a solid mass by soldering them together at the back. The great expense of forms prepared in this way, as well as their inconvenient weight and bulk, is quite sufficient to account for the plan having fallen into disuse. It was indeed only applicable in those very cases in which it was desired to print in very ordinary type with a constant demand, to keep the forms of type standing; and was preferable to that practice only insomuch as it avoided the risk of some of the letters being accidentally loosened and disarranged.

William Ged, a goldsmith of Edinburgh, if not absolutely the first, was one of the first to practise stereotyping, a new art, the works of which have been described by Halley in the 'Philosophical Transactions.' He produced a small model of the name of Virgil, which, by the use of a small plate, was capable of being engraved in a short time, and was sufficiently accurate for the purpose. The name of Virgil was first executed in this manner, and was followed by the names of other authors, and the plates were afterwards sold at a moderate price, and were much in demand for the use of booksellers. The process was afterwards improved by William Ged, who, in 1792, devised a method of multiplying engraved blocks or plates by stereotype or polytype impressions in glass or enamel, which, it was anticipated, would prove very durable, and might be applied with advantage to the prevention of forgery. Ged succeeded in the production of two cases of small wood-cuts produced in this manner.

The revival and introduction into common use of the ste-
reotyping process is, in a great measure, due to the exertions of Karl Stanhope, about the commencement of the present century. Mr. Stanhope communicated to him the result of his experiments, and Foulis, who, as before stated, had been associated with Tilloc, assisted in the trials made at his lordship’s seat at Chevening, in Kent. Andrew Wilson, who had been connected with these operations, and exerted himself much in the promotion of the new process, having received a gold medal from the Society of Arts in 1810, for his ‘great skill and exertions in stereotype printing,’ produced several important stereotyped works, of which the most famous was the one which he had been tried for some time before announcing Dictionary,’ executed in 1809, to be the best. A specimen of his work, which was printed in the twenty-eighth volume of the Transactions of the Society of Arts (pp. 323-4), shows that he was then able to produce very good pages. Another of his works, containing 1803 or 1804 the process which had been perfected at Chevening was communicated to the university of Cambridge, and shortly afterwards to that of Oxford; but the first work printed in this way at the former place did not appear until 1807, and 1809 is the date of the earliest stereotyped book issued at Oxford.

In setting-up a form intended for stereotyping from the spaces, or short pieces of metal by which the words are separated into the letters of the alphabet, and the quadrats, or larger spaces by which blank lines of the form are filled up, the two sets of types are set up and formed into pages in the usual manner, with the illustrative wood-cuts, if there be any; but, instead of these pages being arranged into a form of composition in a frame, they are set in the case with every two or four pages, if small, is separately locked up in a small frame or chase; the pages being surrounded by fillets of wood or metal, which serve in the cast to form a border for attaching the plate to its mount. The face of the box is then placed against the mould, and is, until it is thoroughly dry and hard. They are placed upright in a rack and are usually dried in about two hours. Great care is required in this process, especially when the moulds are large, to prevent them from warping.

After being baked, the mould is placed, with its face down, into a large iron box, called a floating-plate, which lies at the bottom of a cast-iron box rather larger than the mould. The box is then covered in by a lid, the under surface of which is made perfectly flat, and which has the corners cut off, to allow the melted metal to enter. The metal is then poured into the mould, which is attached to an apparatus by which the box is suspended from a crane. It should be observed that the casting-box and plate are heated to the same temperature as the mould, before it is inserted. The box is then swung by the crane over the metal-pit, which is an open vessel containing a large quantity of melted metal, resembling in its composition that used for casting types; and it is lowered into the metal in a nearly horizontal position, being a very little inclined, to facilitate the escape of air from the mould and box. The metal melts in at the corners of the box; and, by its greater specific gravity, floats up the plate with the mould, forcing the latter tightly against the lid of the box. By this contrivance the metal is forced, by hydrostatic pressure, into the mould, in which the type metal is contained in those parts of which the moulds are cut to allow free passage for the metal between it and the floating-plate. After remaining immersed in the metal for about ten minutes, the box is gently raised, and removed by the crane to a trough in which its contents are poured off, from which the surplus metal is removed by blows from a mallet. While the box is cooling, the casters pours in a little metal at the corners, to fill the space left by the contraction of the metal, and so to keep up the necessary pressure upon the cast. When cold, the contents of the box are removed in the same manner as before, and casters pours in a little metal at the corners, to fill the space left by the contraction of the metal, and so to keep up the necessary pressure upon the cast. When cold, the contents of the box are removed in a little metal at the corners, to fill the space left by the contraction of the metal, and so to keep up the necessary pressure upon the cast. When cold, the contents of the box are removed in the same manner as before, and the metal is poured off by blows from a mallet. The plaster mould is then broken away from the cast, the face of which is a fac-simile of the types and engravings from which the mould was taken. As the mould is destroyed by this process, it is necessary, when several stereotype plates of the same page are required, to take a distinct plaster mould for each.

The method of costing this process is usually practised in England; but a different plan has been successfully adopted by Mr. Allen of Edinburgh. The pages of the seventh edition of the ‘Encyclopædia Britannica’ are stereotyped by the new process alluded to, which is minutely described in the article ‘Printing.’ In that work, it is stated that this case, of sufficient depth to receive several moulds in a vertical position, so that, of the work just alluded to, five pages are cast simultaneously. Another plan, which has been adopted, is the reduction of the stereotype plates too large for casting in the ordinary way, but which, of course, has not proved so successful, is to place the mould in a flat iron box, having a trough-shaped mouth at one end, and to pour in the metal with the mould-box, which must be previously heated. After the metal has solidified, it is removed from the moulds, and the plates turned, by letting the original or pattern types or blocks fall upon a mass of soft metal in a half-melted state, is practised in France, and has been repeatedly tried in this country; it is especially adapted for the production of copies of wood engravings, but it is very liable to injure a delicately engraved block. In this way, in the ordinary casting process, the original engraved blocks should be smeared with some adhesive substance that may prevent the cast from adhering to them. In the ‘Treatise on Wood Engraving’ of Chatin and Jackson, a composition of common yellow soap and red ochre is recommended for this purpose.

The alloys used for various kinds of stereotyping differ in their properties, but generally consist of type metal. [Type Founding.]

In the year 1820 Mr. (now Sir M. L.) Brunel patented a method of stereotyping intended chiefly for newspaper work, which, though not brought into operation, may afford a useful hint. He proposed to form a mould of a composition of pipe-clay, chalk or burnt clay, finely powdered, and starch, mixed up with water into a stiff paste, and spread upon a thin and flexible plate of steel. The paste was then to be covered with several thicknesses of calico, or to be laid upon a sanded board. It was next to be covered with a thin film of metal, and pressed upon the types, to squeeze it into the general form. After this the calico and parchment were to be removed, and two sheets of paper placed in their stead; the mould then received another pressure, by which it was rendered more like the face of the types. Finally, the papers were to be removed, and the impression perfected by pressing the mould immediately upon the surface of the types, which should then be smeared with oil. From this mould a cast was to be taken in metal for printing from. By the process of stereotyping employed in newspaper printing it was conceived that time might be saved by printing in duplicate, or by bending the plates on to the surface of a cylinder, by which means they might be printed from more rapidly than when provided with patent, a kind of stereotype plate was to be formed of shell-lac, spread upon a plate of iron, and coated with a thin film of type-metal. These plans are more fully described in Harsand’s ‘Typographia.’

Stereotype-plates need careful examination and picking, to remove the imperfections in the casting. Small hollows, such as the loops of an s, an o, or an o, are liable to be filled up with metal, owing to blebs of air in the mould, and the fine white lines in wood-engravings are sometimes filled up. Such matters should be corrected by the picker, who should also cut down, with suitable tools, such blank spaces as might be liable to soil in printing. Before printing, also, defective letters or words which cannot be corrected by the picker should be cut away, and types inserted in their places. These holes are then filled by molten metal poured through the plate; their stems being sawn off flush with the back.

Although the plates are cast as of equal a thickness as possible, they require, before printing from, to be accurately flattened at the back by means of a pair of pliers, or knife, mounted in a slide-rest, shaved off the metal from the back of the plate in concentric circles, until it is made perfectly even. They are then mounted upon blocks of wood or metal, to tail them into the type. The tendency of wood to warp when exposed to changes of temperature, or to occasional wetting, has led to many projects for mounting stereotype-plates upon blocks of cement or metal, in various supports of metallic mounts which might be applicable to plates of various sizes. When wooden blocks are used, the plates of
are usually secured to them by clips at the edges, and sometimes by screws.

The process of stereotyping is one of the most important means by which the production of cheap books has been facilitated of late years. For a work of limited and temporary demand it is unnecessary; but where the demand is very great, and is likely to last for many years, it always enables the publisher to keep up the supply without the expense of having a very large edition printed at once. In most cases where the demand is uncertain, and in almost all where the demand is sure to be large, it is desirable to resort to stereotyping, because, although it increases the first cost of production, it enables the publisher to avoid, on the one hand, the risk of printing a great number of copies which may prove unsaleable, and, on the other, the outlay necessary for the re-production of the types. In either case the demand should exceed the number of copies first printed. For instance, for a work now preparing for publication in denry octavo, the estimate stands as follows:

| Composing, per sheet | £3 10 0 |
| Corrections, per sheet |  2 0 0 |

The extent of the sale is very uncertain, so that, without the aid of stereotyping, the publisher must either run the risk of printing a large number, or incur the repetition of this expense of 5£ 10s. per sheet, if the sale should outrun their expectations. In case of stereotyping, the same difficulty would occur as to the number which might be required, as the forms of type must be immediately distributed, and therefore the extent of the impression must again be a matter of hazard. All this uncertainty may be avoided by stereotyping the forms, which will occasion an increased outlay, in the first instance, of 2£ 2s. per sheet. A small number of copies may then be printed, and, if the demand should continue, re-issues of a few hundreds each may be made at the mere cost of paper and press-work, and without the delay and risk of error consequent upon re-composition.

The 'Library of Useful Knowledge,' and several other works of the Society for the Diffusion of Useful Knowledge, present striking examples of the advantages alluded to, since, although the demand has been very large and long-continued, and the number of copies sold of some works has greatly exceeded that of others of the same series, the supply has never been interrupted, nor has the expense of re-composition ever been incurred. In cases where great numbers are required at once, stereotyping has been found very useful, since two or more sets of plates may be made, and printed from simultaneously. Its advantages have been particularly felt in the production of the 'Penny Magazine' and 'Spiritual Works.' (For a fuller enumeration of them,) 'Chamber's Edinburgh Journal' is another remarkable instance of the utility of this process; since it enables the publishers to print their London edition in London, by merely sending eight stereotyped plates, which will occasion an increased outlay, to send many thousand printed copies, at a much greater expense.

It has often been urged as an objection to stereotype printing that it tends to perpetuate error; but the fallacy of such a statement may be easily shown. In re-composition new typographical errors are pretty sure to arise, while the expurgation of old ones is by no means certain; but in stereotype plates the occurrence of new errors (excepting by the breaking in of new matter) is improbable, and may be altered whenever they are discovered. Such alterations are not necessarily confined to the insertion of a letter or a word; for whole sentences and paragraphs may be altered in like way, provided that the new matter be made the same in extent as that which is cut away. Hence a stereotyped work may be gradually rendered almost invariable; and an error which otherwise would have run through the whole edition, may be corrected when only a few thousand copies have been composed.

The multiplication of engravings is an object of little less importance than that for which stereotyping is more extensively used. By the help of this art copies of the wood-cuts in Roty's 'Composing,' and other works are supplied, at a very moderate cost, to publishers here in America and on the Continent. This diffusion of engravings has been carried to such an extent, that casts of some illustrations executed for British periodicals have been transmitted to as many as seventeen different countries, for use in similar works.

STERLING, a word applied to all lawful money of Great Britain. In Ruding's work on 'Coinage,' vol. i. p. 13, 4to. edit., the various supposed derivations of the word are given, with a list of the old writers who have assigned it. At a late examination, his origin and derivation are still unsettled; but he inclines, with the majority of the authorities, to attribute it to an abbreviation of Esterlings, people of the north-east of Europe, who were employed in regulating the coinage of England. The word was not in use before the Conquest, though some have given it a Saxon derivation. In the twelfth century its use was common, and in the following century a writer ascribes as much as 12,000 to one man. In the thirteenth century English money was designated all over Europe as sterling. By the statute called the Assize of Weights and Measures, which is attributed, in some copies, to the reign of Henry III. (1216-1272), in others to that of Edward I. (1272-1307), 'the king's measure was made so that an English penny, which is called the sterling, shall weigh thirty-two grams of wheat dry in the midst of the ear.' This is the origin of the pennyweight, though it now weighs twenty-four grains.

STERNE. [Tern.]
STERNSAPIS. [Testudinata.]
STERNE, LAURENCE, was the great-grandson of Dr. Richard Sterne, who died archbishop of York in 1683. Laurence Sterne was born, probably at Elvington and Halifuls, having entered the army, became a lieutenant in Handside's regiment, and on the 25th of September, 1711, 40s., married in Flanders, Agnes, the widow of Captain Hubert, and stepdaughter of a person of the name of Nutt, whom Sterne himself, who had written for the information of his daughter a short time before his death, describes as 'a noted sutler in Flanders in Queen Anne's wars.' His mother's own family name he does not mention, but it is certain he was born at Lisle, in July, 1712, was a daughter, Mary, who grew up to be a very beautiful woman, but made an unfortunate marriage, and died early of a broken heart: Laurence was brought into the world, on the 24th of November, 1713, at Commol in Ireland, where his father and mother had arrived with the regiment from Dunkirk only a few days before. 'My birthday,' says Sterne, 'was ominous to my poor father, who was, the day after our arrival, with many other brave officers, broke, and sent adrift into the world, with a wife and two children.' The lieutenant upon this betook himself with his wife and family to the family seat at Elvington, near York, where his mother, who had inherited the property from her father, Sir Roger Jaques, resided, her husband having been sent to Ireland before, and returned once more for about ten months, after which, the regiment being re-established, they set out to join it at Dublin, whence, lieutenant Sterne being within a month ordered to Exeter, his wife and her two infants followed him thither. The regiment was there reduced to a twelfth part of its full number, the lieutenant, with his family increased by another boy, born at Plymouth, was forced once more to turn his face to Ireland. This must have been about the end of the year 1713, if the chronology of the second volume is to be depended upon. Having got to Dublin, they continued there till the year 1719, which however would be for above three years, instead of only a year and a half, as Sterne seems to state. In that year, he says, 'all unhinged again.' The regiment was ordered to be ordered to assist in the raising of the Spanish Vigo expedition. On their journey thither from Bristol the younger boy died, but his place was supplied by a girl (who died however in childhood) born in September, 1719, in the Isle of Wight, where the lieutenant left his wife and children till the regiment got to Spain, with whom he himself were to unite, but whither he then sent for them. They lived a year in the barracks at Wicklow, where Mrs. Sterne gave birth to another boy; and then they spent six months with a relation of the family. Pethere, in the county of Animo, about seven miles from Wicklow. 'It was in this parish,' says Sterne, 'during our stay, that I had that wonderful escape, in falling through a mill-race whilst the mill was going, and being taken up unhurt; the story is increas'd by the number of people who said they saw hundreds of the common people flocked to see me.' The incident, it seems, is still traditionally remembered in the district.
After this they were in barracks for another year in Dublin—
the year 1725—where they were quartered. Sterne's regiment was next quartered at Mullingar, where a collateral descendant of archbishop Sterne found out his relations, and was found out by them, and, taking them all to his 'castle,' entertained them kindly for a year, and then sent them after the regiment to Garrick's. The latter, which took six or seven days, and is described as 'most rueful and tedious,' the youngest boy died, and also an infant—Mr. George—was sent home. But a considerable sum of money was raised by a public subscription, and paid to the family out of the regiment, and the latter is the same which he afterwards introduced in the second volume of his 'Tristram Shandy' as a Sermon of Yorick's: in the preface to the two first volumes of his collected sermons, which appeared the following year, he says:
I am now so far from the notion of printing these sermons altogether from the favourable reception which the sermon given as a sample of them in "Tristram Shandy" met with from the world:—by
finding two luxuriously printed sermons in it. More likely he could find neither purchasers nor readers, but all the sermons were republished in the collection.

The first two volumes of 'Tristram Shandy' were originally published at York, towards the end of the year 1735, and were reprinted at London early in 1740. Although anonymous, the work seems to have been known to Sterne's from the first; and it raised him at once from obscurity to universal notoriety and high literary fame. This
and his subsequent publications—two volumes of Sermons in
1758, 1760, 1762; 5 and 6 in 1762, 7 and 8 in 1763, 2 more vols. in
1766, the 9th vol. of 'Tristram Shandy' in 1767, and the 'Sentimental Journey' in 1768—probably also
would have been more of money; but his fellowmen in
the period were further improved by his being presented by Lord Fal
bridge, in 1760, with the curacy of Coxwold (also, we suppose, in
Yorkshire), which he calls 'a sweet retirement, in
companion of Sutton.' His celebrity also, it is to be feared,
supposed that the Yorkshire person to new habits of
life, and to some kinds of dissipation not quite so innocent
as 'fiddling and shooting.' In 1760 he took a house at York
for his wife and her only child, a daughter; but his
own occupation he has found to date in London, or on the
continents of the peace, he went to France, whither he was soon after
followed by his wife and daughter. Leaving them both in
that country, he seems to have in the first instance returned to
England, whence, in 1764, he proceeded to Italy, with a
view to the recovery of his health, now greatly impaired. He returned to England in the earlier part of 1767, and,
leaving London for some time persuaded his wife to come over to
him with their daughter, he remained at York till he had
written all that we have of his 'Sentimental Journey.' The
first part, which he then brought up with him to the metropolis,
and published, as has been already stated, in the
beginning of the following year. He lived merely to see
the work brought out; having died, at his lodgings in
Bondstreet, on the 18th of September, 1768 (not September 17, as
is stated on his monument erected some years after in the
burying-ground of St. George's, Hanover
square, where he was interred). He had saved nothing, if
he did not die poor; in fact, the young girl and her
wife and daughter being at York during the races, a collection
which amounted to a thousand pounds was made for them
by some gentlemen there; and they also received a liberal
subscription for three more volumes of his Sermons, which
were afterwards published. In 1775, after her mother's
death, Sterne's daughter, who calls herself, at the end of the
dedication to Garrick, Lydia Sterne de Medalle (having been
married to a person of the latter name), published three series of
her Letters, written to her by Draper, and辐ferred to the
end of her life, along with the short autobiographical memoir from which
many of the above facts have been taken. Some of the
letters in this collection are of a very extraordinary charac
ter to have been either published by a daughter, or left
for publication, as is assumed they were in 1746. The
same year there appeared, under the title of 'Letters to Eliza,
son letters addressed by Sterne, in March and April,
1767, to an East Indian lady, who is described by
the editor as a 'Mrs. Draper, of the East India
Company's service,' she having served as her warrant
to the East India Company, as the writer of
many other letters suggests. It is to be feared that
any other feelings than those of a very warm friendship. The
lady had been dead some years, as well as Sterne himself.
when his letters to her were published; and the latter part of her life, the editor tells us, had been attended with circumstances which were 'generally said to have reflected no less discredit on her integrity or her character.' But whether there is any real ground for this slander we greatly doubt. Mrs. Draper returned to her husband in India after her correspondence with Sterne, and, then making a second visit to England, died at Bristol, and was interred in the cathedral, which latter event has added to her memory. With the exception of one or two fragments, the only other remains of Sterne that have been printed consist of a second collection of letters, in one volume, which also appeared in 1737, under the title of a niece of his, of a curious satirical work, entitled 'The History of a Watchcoat,' which however had been published separately about seven years before.

In 1793 Dr. Ferriar, of Manchester, published an Essay in the third volume of the Memoirs of the Manchester Literary and Philosophical Society, 'Afterswards enlarged and published separately in 1798, and again in 1809, under the title of 'Illustrations of Sterne,' with the view of showing that many passages in his writings were suggested by or imitated from various old and commonly neglected authors, especially Rabelais and Burton's 'Anatomy of Melancholy.' In a literal sense, the charge is sufficiently established; there are some passages in Sterne which may be fairly said to be copied from Burton, Rabelais, and others; and the germs of a good many of his thoughts and expressions must be found in theirs. Of course also the general spirit of his wit and turn of writing must have taken something from the sources with which he is thus proved to have been familiar. But however these detections may affect Sterne's reputation, they are of the quality only where genius is not touched by them. A writer of original genius, under the pressure of haste or indolence, may, if not a scrupulous man, borrow or steal occasionally, as well as the most common-place writer. Sterne, we know, was the reverse of scrupulous; but he may also have had no very peculiar intention in the appropriations that are laid to his charge; it will be admitted that he has for the most part really put a new life into what he has thus reassembled; and he probably thought that in all such cases he gave more than he took. The nature of his writings, it is to be remembered, precluded him from making any formal acknowledgement of his obligations; he could not finish off a chapter in 'Tristram Shandy' with a list of references such as might be appended to an article in a dictionary. Beyond controversy, he is, in his conceptions and delineations separately considered, as well as in his general spirit and manner, one of the most original of writers. His humour is quite as much sub genere as that of either Rabelais or Cervantes or Swift. The reader may have a particular liking for any of these, but all of these, he has much more in which he differs from them, and that is wholly his own. He is, of all English humourists at least, the least and most buoyant. And it is wonderful what a truth and real humanity there is even in his most sarcastic pieces. It is evident to us that no one makes us more well acquainted with human nature, and every artistic probability is preserved in each of them how they all draw our sympathies towards them, how they live like actual existences in our memories and our hearts. It is rather a simple fact than an opinion that the first class of Sterne's dramatis personae, his Uncle Toby, his Corporal Trimm, his Yoricks, rank in that department of our literature next to the Laurencs and Touchstones, the Malvolios and Justice Shallows, of Shakspeare, and far apart from all else of the kind in the language. In the mere art of writing also, his execution, amid much apparent extravagance, is singularly careful and perfect; it will be found that every touch has been well considered, has its proper purpose and meaning, and performs its part in harmony, but the direction of the entire arium, never was possessed in a higher degree by any writer than by Sterne. His greatest work, out of all comparison, is undoubtedly his 'Tristram Shandy'; although, among forensic writers, Tom Jones is by far the estimation, as the highest estimation. But that will hardly be the judgment of any Englishman, though it may be of some English women.

STERNHOLD, THOMAS, was a native of Hampshire. The date of his birth is not known. He was educated at Oxford, of the same college of the name, from which he retained the same office under Edward VI, in whose reign he died, August, 1549.

Sternhold's only claim to distinction is, that he was the principal author of the first English metrical version of the Psalms attached to the Book of Common Prayer. He had undertaken to versify the whole of the Psalms, but completed only fifty-one; the rest were translated by John Hopkins and others. Sternhold's version was not published till after his death: 'All such Psalms of David as Thomas Sternholde did in his Lyfe drawe into English Metre,' London, 1549, 8vo. He was also the author of 'Certaine Chapters of the Proverbs of Solomon, drawn into Metre,' London, 1546, 8vo.

The principal Psalms by Sternehold and Hopkins was not published till 1562, when it was annexed to the Book of Common Prayer, with the title of 'The Whole Booke of Psalms, collected into English Metre, by Thomas Sternehold, and John Hopkins,' conferred with the Eruse, with apt Notes to sing withal.' The printing was in black letter, and the music consisted of the melodies only, without base or other part. Many of the best melodies were adaptations from the German and French. [Psal.-met.] The Reformation introduced metrical versions of the Psalms. The Earl of Surrey, who was beheaded Jan. 19, 1546-7, translated some of the Psalms and Ecclesiastes into verse, which, together with a few poems, were printed by Dr. Percy, but never published, the whole impression having been consumed in the fire which destroyed the printing-office of Mr. Nichols in 1808. Sir Thomas Wyatt also published 'Certaine Psalmses, chosen out of the Psalms of Davids,' London, 1557, 8vo, and another edition, London, 1561, 8vo, into Englyshe Metre; whereunto is added a Prolog of the Aucthore before every Psalme, very pleasant and profettable to the godly Reader,' London, 1549, 8vo. In the same year was published 'The Psalter of Davud, newly trans-
mus. (Plat., Phaedr., p. 244; Steph. Byz., s. e. Maratoph.) Among the various statements of the date of his birth, the most probable, is that it was about 643. He lived to the age of 63, his death having probably taken place in 560 B.C. In his latter years therefore he witnessed the tyranny of Phalaris, against whom he is said to have cautioned his fellow-citizens in an apologue called the 'Horse and the Stallion.' (Arist., Rhet., ii. 20; Conon, Narrat., 42; comp. Horst, Epit., i. 16, 34, &c.) The population of Himera consisted of 20,000; on the other hand 40,000 were the number of Stesichus. He had come to the colony from Metamorius. He is said to have been blind for some time, and according to the story this punishment was inflicted on him for having offended his poetical shade of Helen. His original name was, according to Stephanus, Himeron, and he assumed the name of Stesichus as indicating the art to which he mainly devoted his life, that is, the art of training and directing the solemn choruses at the religious festivals. The first chorus* which he composed was that of washing the horse of the goddess from the sand, under the title, 'Stesichorion Himeraeis Frangmenta colloquii, Dissertations de Vita et Poetis Auctori praesertim. C. Fr. Kleine.' They are also contained in Gaisford's 'Poet. Graec. Minor.' (Müller, Hist. of the Lit. of Ant. Gr., i., p. 197 203; Bode, Gesch. der Lyrischen Dichthtunft der Hellenen, ii., p. 40 83.)

STETTINO, one of the three governments of the Prussian province of Pomerania, is situated between 52° and 54° 10' N. lat. and between 13° and 16° E. long. It is bounded on the north by the government of Stendal and the Baltic sea, on the east by the province of West Prussia; and on the west by Mecklenburg; the area is about 6000 square miles. The population in 1837 was 464,440. The great majority of the inhabitants are Protestants, there being only about 3000 Roman Catholics and 1500 Jews. The government is divided into 59 circles.

STETTIN, the capital of the whole province of Pomerania, as well as of the government of the same name and of the circle of Randow, is one of the most flourishing commercial towns and one of the strongest of the Prussian monarchy. It is situated in 52° 26' N. lat. and 14° 45' E. long., on an eminence on the left bank of the Oder, which divides into four branches, viz. the Oder, or the main stream, the Parthenitz, and the Great and the Little Regelia. The principal anxiety in the town is caused by the bridge, 380 feet in length, across the Parthenitz, one of 120 feet on the Little Regelia, and one of 630 feet in length on the Great Regelia. The suburbs Ober- and Unter-Wieck, and of Alt and Neu Torney, are not included in the fortified part of the town. Stettin is the residence of the Bishop of Stettin, and of the members of the provincial government and other establishments. The proper citadel is called Fort Prussia, besides which there are forts William and Leopold. The town has five principal gates and eight posterns. There are seven squares. The principal church is the cathedral, the great barracks, the three hospitals, and the theatre. There are five churches and a Roman Catholic chapel. The above-mentioned library is one of the most complete in Pomerania, and contains many valuable MSS. relating to the histories of foreign countries, and to the present condition of the various nations. Besides the gymnasium, to which an observatory is attached, there are a school for training teachers, a school for industry for boys, and a school of navigation, and many others. The charitable institutions are very numerous and well supported. Se of a Principality of Stettin, 1795, and of the French Protestant consistory. The population is 34,000, including the garrison, which is very numerous. The manufactures are woollens, linen, cotton, leather, hats, stockings, ribbons, sail-cloth, soap, and tobac; and the ships and vessels and craft are the pride of the Prussian state, and the ships' anchors for all the ships of the Prussian states are manufactured here. The trade of Stettin is very considerable, being the chief port for the manufactures and produce of Silesia, and for the importation of all kinds of foreign goods, especially colonial produce, for the supply of Berlin, and other places. A railway is at present constructing between Stettin and Berlin. The Sound duty makes the conveyance of goods more expensive, and the ships have not always return cargoes. Goods should naturally flow from Berlin and the other Hanseatic towns to the Baltic ports, and from Hamburg and the Baltic. The channel was however deepened in 1827. The number of ships that arrive here annually is about 1000, of which perhaps a fourth may belong to the merchantmen of Stettin. There are resident consuls of England, France, Russia, the Netherlands, Hanover, Portugal, and North America.

Among the remarkable persons born at Stettin, was the most extraordinary woman of her age, Sophia Augusta Friederici, princes of Anhalt-Zerbst, afterwards and empress Cathol. II. of Russia, and Sophia Doro- then, daughter of Wurtemberg, mother of the reigning em-
peror of Russia. The fathers of the two empresses were
governors of Stettin. The magistrates having complimented
Catherine on her accession to the throne, she ordered that one
copy of every gold medal struck in Russia should be given
to the city, which has left, on 90 a 100 of these medals.
(Müller, Handbuch; Hirschelmann: Hessel; Stein.)

STEUART, SIR JAMES, born at Edinburgh, October
21, 1712, was the only son of Sir James Steuart, solicitor-
general for Scotland, under Queen Anne and George I.
After being educated at the Scotch College, he was
sent to the Continent, where he spent several
years, and at Rome was introduced to the young Pretender.
He was unfortunately called to Edinburgh by the illness
of his wife at the period of the rebellion of 1745, where his
influence, though not exercised, took no part in promoting his designs. After the battle of
Culloden he found it prudent to retire to the Continent,
where he remained for the next seventeen years. In 1753
he was permitted to return to his native country on the
understanding that he would not be molested so long as he
remained quiet, but it was not until 1771 that he received
a free pardon. Having settled at Coltness, the seat of his
family, in the county of Lanark, he finished the most im-
portant period of his life, on which he had been engaged
during his long exile. It was purchased by Andrew Miller, the
bookseller, for 500£, and appeared in London in 1767, in
two quarto volumes, entitled 'An Inquiry into the Principles of
Political Economy.' As the British law of copyright did not
extend to that edition in the British colonies; and in 1770 a
second edition of the work was called for in England.
He wrote also on the coinage of Bengal; on a plan for a
form of commercial union; and on one of the Continent
published in French a 'Vindication of Sir Isaac Newton's
Chronology;' and he was also the author of several meta-
physical disquisitions, the two principal ones being on
Booth's Essay on 'Abstraction,' and on his 'System of
Nature.' He died in November, 1780, aged 67. His
only son, General Sir James Steuart, erected a monument
to his memory in Westminster Abbey, and in 1803 he published
a complete edition of his father's works, in six
volumes.

It is remarkable that Adam Smith, whose work on
the same subject appeared nine years after Steuart's, has not
once referred to his predecessor. He is stated to have said
that he understood Sir James's system better from his con-
versation with his son, on which he had been engaged during
Mr. M'Culloch remarks, that his statements and reasonings
are 'singularly perplexing, tedious, and inconclusive,
though he adds that his work 'is by no means destitute of
enlarged and ingenious views.' The fifth book treats
privy-bag, and of the third, the industry of trade and
industry; the third, of money and coin; the fourth, of credit
and debts, and incidentally of interest and banks; and the
fifth book relates to taxes. At the end of each book there
is a concise summary of the arguments presented in the first book but
merit of placing the theory of population in nearly the same
light as that in which it is now generally viewed. The
author's want of confidence in the efficacy of the com-
mercial principle is in striking contrast with the views of Adam
Smith. He proposed that granaries should be established
for the purpose of collecting stores of corn in cheap years
and selling them in dear years. But the work is now
entirely superseded, and is interesting chiefly in connection
with the history of political economy.

STEVENS, GEORGE ALEXANDER, was born in
London, and brought up to a trade, which he deserted at an
careful age for the profession of a strolling player, in which
he continued several years, chiefly in the Lincoln company.
In 1753 he had an attack of illness, and published a poem
entitled 'Religion, or the Libertine Repentant.' In 1752
the Libertine had ceased to be repugnant, and obtained an
engagement at one of the Dublin theatres, where he pro-
duced his best pieces, chiefly called to
In 1753 he was engaged for Covent Garden Theatre, and
came to London. Stevens was not a good actor, but he
wrote songs which he sang at convivial societies, where he
and his songs were much admired. He led a life of dis-
trustful and generally necesious and always extravagance.
In 1768 he published a novel, 'The History of Tom Fool,'
2 vols. 12mo.

The first sketch of the work by which Stevens is chiefly
known, the 'Lecture on Heads,' was intended for Shatter's
actor, to be used at his benefit; but he did not avail
himself of it. Stevens then enlarged the plan and
adapted the details, and having furnished himself an immense
necessary apparatus of heads, &c., in 1763, or thereabouts,
he began to perform in the principal towns of England
and Scotland, with great success and a large profit. He
afterwards went to North America, where he was not less
successful. About the age of twenty he returned, about
two years he returned, and then proceeded to Ireland.
In a few years he realised about 10,000£. In 1766 he pro-
duced a 'Supplement; being a New Lecture upon Heads.'
It was only performed six nights. In 1770 he brought out
his 'Lectures and Songs,' a collection of the music by Dr. Fisher, but added nothing to the fame of
either author or composer. In 1772 he published his 'Songs, Comic and Satirical,' Oxford, 12mo.
In 1773 he exhibited 'A Trip to Portsmouth.' After a few
lectures'He several more, he sold t.1 Lee Lewis, who, with
the assistance of Mr. Pion, made some improvements, and
continued to perform with tolerable success for some
years. Meanwhile Stevens' faculties began to fail, and he
began to lose, in the estimation of the public, the
perception of his a great part of his property, viz.,
his £760 large Songs, Lectures, &c., which
produced the immense sum of £5 or £6 per annum.

Stevens' 'Lecture on Heads' has a thin sprinkling of
wit, many sledge humours, much good deal of
verse are extravagant than forcible; but that abundance of
dress, manners, modes of speaking, and other peculiarities
of the day, were exhibited with so much liveliness, if
not truth, as to render the performance exceedingly attrac-
tive. One of the best things is perhaps the report of
the trial, 'Bullam versus Bobom.' 'Daniel versus Dub-
clout' is not so good. Stevens' 'Songs, Comic and Satir-
ical,' amount to more than a hundred. They were
considered classical by the Choics Spirits of that time, being
filled with practical, political, and other thoughts, and
so forth, together with personifications of the virtues
and vices. They are chiefly bacchanalian and amatory,
several are satirical, a few licentious, but not one 'comic.'
Only one has retained its popularity, 'The Storm,' which
is indeed the only one worthy of being popular. It ap-
ppears in Stevens' Songs as 'The Marine Medley.' It
has been since altered; some of the worst lines have been
omitted, and others more suitable substituted, the versifi-
cation of the stanzae made uniform, and indeed the song as a
whole is improved. Still there are some rough places in the first,
'Cease, rude Boreas, blustering raider,' but this line is
not in the original song. With all its defects how-
ever there is so much animation and truth of description,
that it is a popular and instructive song. The supposed narrator with such natural earnestness and energy,
as to render the song, in its kind, perhaps one of the best in the
language.

(Life, attached to Stevens' Works; Baker's Biography
Dramaticus; Watt's Bibliotheca Britannica; Biographie
Universelle.)

STEVENS, RICHARD JAMES SAMUEL, a com-
poser of numerous glees, many of which display the most
brilliant traits of genius, was born in London, about the
year 1743. He was educated in the Clarendon School, at
Richard Savage, almoner and master of the choristers. His
first appointment was as organist to the Temple church.
In 1753 he succeeded Mr. Jones in the office of organist of
the Charter-house; and in 1801, on the death of Dr. Ay-
ward, became the successor of that great master of the
organ. In 1782 he gained the prize-medal from the Catch Club
for a serious glee, and another in 1816 for a cheerful glee.
These, with many more compositions of the same class, are
admitted by him to be his best works under the name of 'G. S.
my heroes are low,' in which the poetry and science of
music are equally blended, speedily and most deservedly
obtained the stamp of public approbation, which they
will never lose so long as vocal harmony shall be admired.
Mr. Stevens was by no means extravagant in his choice of
some songs, and edited a useful collection of anthems, &c. in
three folio volumes. He died in 1837, leaving one son.
STEVIN, SIMON, a celebrated Flemish mathematician, was born about the middle of the sixteenth century, at Bruges: it has been ascertained that he went to reside in Holland, where he obtained the title of mathematician from the States-General. Mind that he first took an engineer to the States, the charge of constructing and repairing the dykes being confided to him. It is to be regretted that no other particulars concerning his life have been preserved: even the year of his death is unknown.

He's place is known only to the subscribers to his posthumous works, which he published in Antwerp in 1685; and in the same year he published a collection of geometrical problems in five books. He appears to have studied algebra with great attention, and to have attempted the establishment of the general improvements. The principal of these consist in the construction of fractional indices, as exponents of the roots of quantities (the use of integers as the exponent of powers had previously been introduced by Stifel), and in a general but rigorous method of approximating in numbers to the root of any equation. He represented the unknown quantity by a small circle; and a number, either integral or fractional, contained within the circle, indicated a power or root of that quantity.

In 1630 Stevin published a quarto, and in the Dutch language, his tract on statics and hydrostatics, in the face of which he endeavours to prove that the Dutch language is more ancient than any other; and in the same year he published, also in Dutch, his New System of Fortification. In 1689 he published his treatise on the algebra of Diophantus (the four first books were translated from the Greek by Stevin, and the others by Girard), and an explanation of the tenth book of Euclid; tracts on cosmography, geography, and astronomy, the practice of geometry, mechanics, and fortification, and a method of fortifying places in which manœuvres of water, by means of sluices, were to contribute to the defence.

The work on statics contains a simplification of the demonstration of Archimedes relating to the fundamenta of the lever. Stevin represented the two weights at the extremities of the lever by parallelograms suspended horizontally by strings applied at their middle points: the breadths and depths of these parallelograms were found equal, which is true, and the other parts were found proportional to the lengths of the arms from whose extremities they were suspended.

In order to exhibit the conditions under which a body is in equilibrium on an inclined plane, Stevinus supposes a triangular prism to be placed with one side parallel to the horizon, so that the other sides may form a double inclined plane; and he imagines a string, on which are placed a number of equal weights, at equal distances from one another, to be laid on this inclined plane: and he makes each part of the string of weights extend from the edge to the base of the prism; or the two extremiti of the string are at equal distances below that base. He concludes that the string so placed would be at rest on the two planes, because it is capable of moving the string of weights being of infinite length), it would move for ever, which he supposed to be absurd, so that the tendency of the weights to descend on one side must exactly counterbalance the like tendency of those on the other side; and evidently the distance of the weight from the edge of the triangle where the weights lying on the other, in the same proportion as the lengths of those planes respectively, the lengths being measured in directions perpendicular to the edge of the prism. Hence he infers that the same power is required to support a single inclined plane of equal height, when the weights of the bodies are proportional to the lengths of the planes. If one side of the prism is in a vertical position, the tendency to descend is evidently equal to the weight; and hence, on every inclined plane, the sustaining power, in a direction parallel to the plane, is to the weight of a body, as the height of the plane is to its length.

From this theory, also, Stevin discovered that an equilibriur between three forces acting at one point in a body, takes place when the forces are parallel and proportional to the three sides of a triangle. His demonstration however was, that the system in which the forces are at right angles one to another; for he states that when a body is supported on an inclined plane, and retained by a force acting parallel to the plane, it is in the same circumstances as if it were suspended by two strings, one parallel to the plane, and the other perpendicular to it. He concludes that the ratio of the weight of the body to a force parallel to the plane, is as the hypotenuse to the base of a right angled triangle formed by three lines, one in a vertical direction, another perpendicular to the plane, and the base or third side being in a horizontal position.

Stevin is said to have contrived a car which moved by means of shafts, on the flats of Holland, with more rapidity than any carriage drawn by horses.

STEWART, MATTHEW, D.D., a mathematician of North Britain, who attained great distinction by his researches of a mathematical nature, and a singular praiseworthy acquaintance with which he cultivated the ancient geometry. He was born at Rothsay, in the Isle of Bute, in 1717; and having received the best education which a grammar-school afforded, he prosecuted his studies in philosophy and theology at the University of Glasgow, into which he was admitted in 1734. Dr. Simson, who then occupied the chair of mathematics in that university, is said to have early discerned the prellection of Stewart for mathematical studies, and in a letter to the president of the University of Edinburgh, he mentions that distinguished judge of the courts of justice, who had the curiosity to encourage him for his studies, and was the first to introduce him into the college society. Stewart was at once a favourite with his seniors, and the president himself. He was elected a Fellow of the Royal Society in 1764; and he died in 1785, being then sixty-eight years of age.

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The first efforts of Dr. Stewart in science were to extend the subject of what is called the 'locus ad quatuor rectas' to the powers of any number of perpendiculars drawn to an equal number of lines. While engaged in this pursuit, after his retirement to Ralston, he discovered most of those propositions, in 1746, he published under the title of 'Geometrical Theorems.' These, which are mostly porisms, are sixty-nine in number, but five only of them are accompanied by demonstrations. Dr. Stewart is said to have suppressed, for the sake of brevity, the proofs of his other propositions; but several of the theorems were afterwards demonstrated by Dr. Small, and Mr. Lowry has given, in Leybourne's *Mathematical Repository,* demonstrations of all those which admit of investigation by the processes of the mind.

In the first volume of the *Essays of the Philosophical Society of Edinburgh,* there is a paper by Stewart containing some propositions founded on a theorem in the fourth book of Pappus; and, in the second volume of the work, he gave a solution of *Kepler's problem,* in accordance with the methods of the antients. This he accomplished by the application of a property of curves, from which the approximations may be carried to any degree of accuracy by means of a rapid converging series.

In 1761 he published his *Four Tracts, Physical and Mathematical,* in which there is an attempt to investigate the higher parts of mixed mathematics in a manner conformable to the spirit of the Greek geometry. The first tract contains the definition of a new figure, in which, admitting the quadrature of curves, are rigorous; and in the remainder of the work Dr. Stewart considers the intricate subject of the perturbations. His design was to carry on the approximations for determining the elements of the planets according to the method of Lagrange, Machin, Walmsley, and other eminent mathematicians had begun the investigations; but the work stops far short of the euda now proposed in the researches of physical astronomy.

In the following year he published a series of geometrical propositions, which are investigated analytically, and afterwards demonstrated by sybhothetical processes: they are entitled, *Propositiones More Veteranum demonstratarum,* and this dedication is said to have been given to them by Dr. Johnson. His last work was an *Essay on the Sun's Distance;* and this problem he endeavoured to treat according to the method of the antients, but the subject is too intricate to admit of their analysis being applied to it, though the work exhibits all the ingenuity which might be expected from the learned author. Making use of the movement of the moon's apsides as an effect of solar perturbation, he determined the parallax of the sun to be 69', and it is now known to be about 8'. Being obliged, in order to diminish the complexity of investigation, to neglect quantities which were supposed to have but small influence on the result, considerable errors exist in the steps; and, except that compensations occurred, the parallax might have appeared to be too great as it is.

The text was much admired on by Dawson and Learner during the life of the writer; and since the true parallax of the sun has been ascertained from the transit of Venus, in 1769, it is admitted that no reliance can be placed on the determination of such an element by inductions drawn from the effects of the mutual attractions exercised by the bodies of the solar system.

STEWART, DUGALD, the son of Dr. Matthew Stewart, was born in Edinburgh, on the 22nd of November, 1725. He was educated in Edinburgh, and the progress he made in classical and mathematical attainments was such as to excite the warmest expectations of future success. In the winter of 1772, having that year attended the course of lectures delivered by Dr. Reid at Glasgow, his love for metaphysical speculation was roused, and he wrote and read to a literary association an *Essay on Dreaming,* which he afterwards incorporated in his *Elements of the Philosophy of the Human Mind,* etc. (Chap. 5). He was married in the same year.

But still more decisive was the fulfilment of his early promise a short time afterwards, when, having completed his Glasgow studies, he assumed the charge of the mathematical classes hitherto taught by his father in the university of Glasgow, (Chap. 8). In 1795, on coming of age he was appointed mathematical professor.

He taught with great success until his fiftieth year, when an occasion presented itself for resuming his favourite studies under the most advantageous position. Dr. Ferguson, the then professor of moral philosophy at Edinburgh, having been sent as secretary to the commissioners and philosophers to Paris, Dr. Stewart was called upon to fill his place during his absence, which he accepted, and during the session 1778-9, besides teaching his own classes of mathematics, and one on astronomy, he lectured on ethics for Dr. Ferguson; thinking it was for the best that he should have the proofs of his abilities in the mind and character of his pupils extemporaneously. His amiable and elegant manner was much relished, and his lectures gave so much satisfaction, that on the retirement of Dr. Ferguson, in 1781, he was appointed his successor. He had previously had one or two private pupils out of his family. He was thirty-two years of age when he entered upon his new professorship. His mind had become enlarged and enriched with a discursive, desultory, but little in order, manner; his opinions had become fixed, and the habitual grace and mildness of his manner had become still more winning from his increasing confidence and facility of expression. He became very popular. His lecture-room was crowded, his fame spread over Great Britain before he had come to the frontier of his college; but such, indeed, was his success, that in 1792 he was appointed professor. In the following year (1793) DugalD published his *Outlines of Moral Philosophy,* a text-book for his pupils; and the *Life of Adam Smith,* which appeared in the *Transactions* of the Royal Society of Edinburgh; and which was followed by the *Life of Dr. Robertson* in 1796, and the *Life of Dr. Reid* in 1800. They have been subsequently reprinted. His activity was unceasing; and in 1800 he added a series of 'Lectures on Political Economy' to his heavy professional duties, but they were not continued.

For many years he gave occasional series of temporary lectures for them on natural philosophy, logic, and rhetoric. In the winter of 1808-9, from grief at the loss of his younger son, which brought on a severe indisposition, he was obliged to have a deputy to discharge his duties; and the first of these was Mr. Hume. On recovering his health, he resigned altogether; and in May, 1810, Dr. Thomas Brown, his late assistant, was appointed in his place. DugalD Stewart, having now retired from public life, lived constantly at Kinmell House, on the Frith of Forth, about twenty miles west from Edinburgh, where he devoted himself to the prosecution of his favourite studies. The fruits of his retirement were not slow in manifesting themselves: in 1810 appeared his first volume of Philosophical Disquisitions (Chap. 11.).

'The state of my health having interrupted, for many months past, the continuation of my work on the human
mind, I was induced to attempt, in the mean time, the easier task of preparing for the press a volume of Essays. Yet it is in this work, which he considered 'the easier task,' that he has best proved his claim to the title of a metaphysician, which is noticed both by Sir James Mackintosh and Professor Cousin (Pragmatism Philosophiques, p. 78). Indeed his chief work, as he frankly owns, is rather a collection of such theories pointing towards the common end of throwing light on the structure and functions of the mind, than a systematic treatise, such as might be produced from the study of facts. 'Such, indeed, of this kind,' says Mackintosh, 'that he has most surpassed other cultivators of mental philosophy. His remarks on the effect of casual associations may be quoted as a specimen of the most original and exquisitely taste and 'moral force of genius, and, perhaps,' Dugald Stewart observes, 'as exquisitely, when an exclusive regard to diction was the exercise of the most refined taste. 'Few writers,' remarks his friendly critic, 'rise with more grace from a plain groundwork to the passages which require greater animation or embellishment. He gives to narrative, according to the precept of Bacon, the colour of the time, by a selection of happy expressions from original writers. Among the secret arts by which he distinguishes eloquence over his diction, may be remarked the skill which, by deepening or brightening a thought, is produced by opening or closing the mind; glimpses of a thought to be afterwards unfolded, observably heightens the import of a word, and gives it a new meaning without offence against old use.' (Edin. Rev., 1816.) Sir James Mackintosh afterwards repeated this vibration in the Preliminary Dissertation to the Supplement to the Encyclopaedia Britannica, 'an article of Mr. Stewart's works, and the most glaring contradictions to his own principles impute his logical agonies, by the style and his calm earnestness always renders his works interesting to students.

(Encyc. Brit., art. 'Stewart;' Sir J. Mackintosh's Preliminary Disc. to Encyc. Brit.)

STEWART, Thomas, born in Ayrshire, 18 miles south-west from Glasgow, on the road to Kilmarnock, from which it is distant five miles. The parish is in the district of Cunningham; and extends ten miles in length from north-east to south-west, and from three to four in breadth. The town is about seven miles from the sea; but the land slopes from north-east to south-west, in which direction the Annock-water, which drains the parish, flows. Freestone and limestone are dug, but there is no coal. The population in 1831 was 4656, viz. 2354 in the town, 735 in the ten suburbs, and 2567 in the rural district. The census of 1836 makes the population 5452. The town of Stewart is on the north bank of the Annock-water: it has risen to importance only since the extension of manufactures of various kinds. The place is long been noted for its excellent Highland bonnets, of which it is now the chief seat, and in connection with which are stalls for carding and spinning wool. The manufacture of carpets has also been introduced, as well as the weaving of silks, muslins, linens, and damasks. The manufacture is usually carried on in the light yearly fairs. The church is in the centre of the town: it has sitting for 1400 persons. There are meeting-houses for the dissenters of the United Secession Church and for Burghers. A small Independent congregation meets in the town-house. The parish is in the synod of Irvine and presbytery of Glasgow and Ayr. There were in 1834 ten schools in the parish, viz. the parish school, with an average attendance of about 37, viz. about 14 boys and 13 girls, and nine others; the whole number of children under 15 years, who were learned or were intended to be, were 6144. This is the number of places of public worship, viz. 37.

(Chamber's Gazetteer of Scotland; Parliamentary Papers.)

STEYER, the capital of the circle of the Traun, in Upper Austria, is situated at the confluence of the Traun and Enns, which is surrounded with hills and lofty mountains. It is situated in 46° 15' N. lat. and 14° 20' E. long. 92 miles south of Vienna, and 16 miles south-south-east of Linz. Steyer has nine suburbs and five gates. The town is on the left bank of the Enns, which separates it from the suburb Ennsdorf, as the Steyer does from Steyendorf, with which two suburbs it is connected by two bridges. From the latter suburb, almost at the confluence of the two rivers, there is a most delightful prospect. On a steep bank of the Steyer, opposite to castle of Prince Lamsberg stands on

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the site of the old castle, which was built between 980 and 990, and was for many centuries the residence of the princes of Styria, till they removed to Graz. Steyer is a neat and a pretty large town, with above 10,000 inhabitants. Many of the streets are narrow, and crooked. There are three square towers; the principal square is very large and ornamented with two fountains. Many of the houses are built in the Italian style, with flat roofs, galleries, and statues, especially in the great square. Among the public buildings there is a church called the Dominican church (in the great square), with ancient painted glass windows; the ancient parish church, a massy Gothic edifice, with a lofty tower, from which there is a fine prospect over the town and the country, to the distant summits of the Alps, and the town church of St. Michael's church, formerly belonging to the Jesuits; the theatre, the barracks, and four hospitals. Steyer is the seat of the court of justice of the circle of the Traun, and of a superior mining-court. There are normal and four other schools. Steyer has some woollen and cotton manufactures, but it is chiefly remarkable for those of iron, which employ above 12,000 workmen in the town and neighbouring country. The principal establishment is a manufactory of fire-arms on account of government; of the numerous other articles the chief are sword-blades, daggers, bayonets, files, razors, awls, to which some writers add scythes, and kitchen utensils of all kinds; but Mr. Jenny (who, in his description of the town, includes them in his large but not very accurate enumeration) says that no such blades are manufactured here. Steyer is one of the most important and flourishing manufacturing towns in Austria, and has a very extensive trade, especially to Turkey and the Levant. In the town Steyer is the richest town in Austria next to Vienna. It has several times suffered severely by fire.

(Blumenbach, Oesterreichische Monarchie; Jenny, Handbuch fur Reisende in dem Oesterreichischen Kaiserstaate; Cuvier, General and Zoological National Encyclopaedia; Cannabich; &c.)

STEYERMARK. [STYRIA.]

STEYING. [SUSSEX.]

STICKLEBACK, the common name in this country for certain small fishes which constitute the genus Gasterosteus of Linnaeus. This genus is arranged by Cuvier with the mail-cheeked Acanthopterygians (Loricati), and is distinguished by the following characters:—Anterior dorso—represented only by free spines; body generally scaleless, but possessed more or less at the sides by shield-like plates; ventrals reduced to a single spine; head without spines or tubercles; branchiostegous membrane with three rays.

Several species of stickleback are found in the ponds and slow streams of Britain, and are sometimes found in fresh water; they are very active and voracious, and live upon aquatic insects and worms.

The most common species is the three-spined stickleback (Gasterosteus aculeatus, Linn.), which is distinguished by the three spines extending at the sides of the body, and the possession of three spines on the back. It is of an olive colour above and silvery white beneath, and varies from two to three inches in length. In the breeding season the males assume a pink hue on the under parts of the body, and the general colouring of the upper parts becomes brighter, and often green. According to Bloch, this species spawns in April and June; and according to Cuvier, in July and August.

The number of scaly plates varies in the sides of the body, and is supposed by some authors of high authority to afford specific characters. The following are the principal varieties or species established by Cuvier and Yarrell chiefly upon this character.

G. truttula, wren-tailed stickleback (Yarrell, Brit. Fishes, vol. i., p. 76). The scaly plates extending the whole length of the sides; in number about thirty.

G. seminatras, half-armored stickleback, Yarrell. Lateral plates extending to a vertical line joining the vent and opening of the soft dorsal; in number from twelve to fifteen.

G. leirus, smooth-tailed stickleback, Yarrell. Lateral plates extending only as far as the ends of the rays of the pectoral fins, where these last as laid back.

G. pumilus, thread-tailed stickleback, Yarrell. Lateral plates not extending beyond the pectorals; dorsal and ventral spines very short.

The above are regarded as varieties of the Gasterosteus aculeatus, Linn., by Mr. Jenyns, who observes that this species is subject to great variation, not only in the number of lateral plates, but in several other less obvious respects. These and other species varying when all other characters remain the same. From these circumstances combined, I feel satisfied that the above are mere varieties, notwithstanding the high authorities on which they rested regard them as distinct species. (Manual of British Vertebrae Animals, p. 349.)

A writer in the 'Magazine of Natural History,' vol. iii. p. 329, relates some interesting observations illustrative of the habits of these little fishes whilst in confinement in a tank. "Whoever few are first put in, never remain in a shoal, apparently exploring their new habitation. Suddenly one will take possession of a particular corner of the tub, or, as it will sometimes happen, of the bottom, and will instantly commence an attack upon his companions; and often, when he is apparently overpowered, makes a desperate attempt to escape before either would give way; and when one does submit, imagination can hardly conceive the vindictive fury of the conqueror, who, in the most persevering and unremitting manner, continues his attacks until fairly exhausted with fatigue. They also use their spines with such fatal effect, that, incredible as it may appear, I have seen one during a battle absolutely rip the opponent quite open, so that he sank to the bottom and died. I have occasionally known the four parts of the tub taken possession of by as many other little tyrants, who guard their territories with the strictest vigilance; and the slightest invasion invariably brings on a battle. These are the habits of the male fish alone; the females are quite supine; appearing, as it were, in full view, with all the brilliant colours of the male, by whom, as far as I have observed, they are unmolested."

Dr. James Stark discovered near Edinburgh a new species of the present genus, which, in every particular resembles the common species, but is rather smaller, and has four spines on the back. It is the G. spinulosus (four-spined stickleback) of Yarrell and Jenyns.

A still smaller species—the ten-spined stickleback (G. spinulatus, Cobb)—is quite distinct in four details, so far as the English name implies, by the possession of ten spines on the back, and these are short and of equal length.

This, as well as the other species of the genus, is occasionally found in the salt-water. It appears to be pretty common near the coast of England and France.

Lastly may be noticed the fifteen spined stickleback (G. spinachius, Linn.), which is also found in England, a comparatively large species, being five or six inches in length, of an elongated and slender form, and having the snout much produced. The fifteen spines on the back are small and short; the fins are proportionally large.

This species appears to be confined to the salt-water, and feeds upon small crustacæ, as well as the eggs and fry of other fishes. It constitutes the subgenus Spinachius, and is the Spinachius vulgaris of Fleming.

STIFEL, or STIFELIUS, MICHAEL, a celebrated German algebraist of the sixteenth century, was born at Erlingen, in Saxony; the year of his birth is not known with certainty, but, according to Teubner, it is 1499. He was a Lutheran clergyman, and a contemporary of Cardan; and it may be mentioned as a remarkable circumstance, that algebra should at the same time have been diligently studied both in the north and south of Europe, whereas it was formerly but little known, and chiefly among the persons who were engaged in the pursuit. Of the men who distinguished themselves in the north may be mentioned Rudolph, Stifel, Scheubel, and Stevin; and among those of the south were Ferreus, Cardan, Tartaglia, and many others. For a more extended account of the subject, see in some respects from that which was used in Italy; and from this circumstance it has been supposed that the ma-
thematicians of the two countries obtained the first principles of the science from distinct sources.

Stifel's first publication was a treatise on algebra, in German; but in 1544, that is, a year before Cardan's rule concerning cubic equations was published at Basle, he remitted, in Latin, the "Arithmetica Integra," which is his principal work. It is divided into three books, of which the first is a treatise on arithmetic; the second, a commentary on Euclid's tenth book; and the third, a treatise on algebra, which is, indeed, a work for which a part of the signs + and − between quantities, in order to indicate addition and subtraction: the first power of the "one" (the unknown quantity) in an equation designates the root of the equation, and represents it by a letter of the alphabet. In the continuation of the exercise, the powers of the numbers 2, 3, &c., both positive and negative, to denote the corresponding powers of the quantities to which they are affixed, and he calls the numbers so applied the exponents of the powers, as they are called at present. He uses the radical sign to designate a root, but he has no mark to denote equality, the word itself being employed for that purpose.

In one of the chapters he demonstrates, from the nature of a square or circle, that the difference of the squares of two consecutive odd numbers is always an even number, and the difference of the squares of two consecutive even numbers is always an odd number. His method of resolving quadratic equations is by completing the square, as is done at present.

He treats at some length of what are called triangular numbers, that is, of adjoint columns of numbers constituting the common product of two columns of numbers; the numbers in the first column may form an arithmetical progression beginning with 1, and having unity for the common difference; the second column may begin with 3, and the successive differences be 1; and, if the third column may begin with 6, and the successive differences be 2, 3, 4, 5, &c., the third column will have the ratios of the coefficients in the binomial quantity, and in extracting the roots of numbers; and it may be observed that such tables have since been made to serve several other useful purposes in mathematics.

Stifel wrote also a treatise on the calendar, and a tract on 'tangential sectors.' Like many other learned men of his century, he appears to have spent much time in studying the Apocalypse, and he is said to have predicted that the end of the world would take place in the year 1553. One of his countrymen, also a mathematician, who lived at this period, and was astonished for the time of that event the year 1524; and in Britain, the celebrated Napier found out that it would occur between the years 1588 and 1700.

Stifel died at Jena, in 1567.

England to inquire into the conduct of Stigand; and several things being proved against him, he was deprived of his dignities and degraded from the clerical order. He was also condemned to perpetual imprisonment; but soon died, being, as it is said, starved to death, either by the wiles of others or by his own voluntary act. He died at Winchester, and was buried there. Lanfranc succeeded him.

STIGMA, in Botany, one of the three parts into which the central organs of the flowers called carpels are divided. The term pistol is applied to the pistil, and is used by some authors for the pistil and stamens, or stamens and pistil, but not one or many of them, whether they are united or separate. The carpel consists of three parts: the ovary or germin, generally of a spherical form, and hollow, containing the ovules; the style, an elongated organ, formed of a number of the ovary; the stigma, or the point or summit of the style. The carpels, like all other parts of the flower, are modifications of the leaf, and examples of their reversion to their normal form are not unfrequent. This is well seen in the double cherry, in which the pistil often appears as a little leaf in the centre of the flower. The blade of the leaf corresponds to the ovary of the carpel; the midrib, which is elongated, to the style; and the tip of the blade to the stigma. The surface at the point of the style, communicating with the interior of the ovary leaf. The carpel presents two sutures, called dorsal and central. The first of these corresponds with the midrib of the leaf, and the latter with the folded edge. The shape of this organ shows the axis of the plant, and is the point from which the placenta is developed, to which the young ovules are attached.

When there is only one carpel in the flower, it is called a simple pistil; but when there are several carpels, they are called a compound pistil, or pistil complex. The pistil may be either united or separate. When they are united, they are called by Linnean syncarpous. This union may occur between the ovaries only, leaving the styles distinct, as in Nigella, the nigella, or Gelsemium, stigmas, and all may be united, forming one body, or pistil, as in the rose. When the carpels are all separate, as is seen in Caltha, Ranunculus, &c., the pistil is said to be apocarpous.

The style is not at all essential to the existence of the carpel; and it is frequently absent. When present, it is composed of just the same tissues as the ovary, which in most cases consist of vascular surrounded by cellular tissue. The style varies in form and size; sometimes it is flat, as in the Iris and Canna, but is mostly cylindrical and flatforn. It generally proceeds from the apex of the ovary; but in some cases, from an alteration in the position of the ovary, it proceeds from other parts besides the apparent apex, as from the side in Alchemilla, and from the base in Lamium and Boraginaceae. The length of the style varies much; in some species, it is short or Siphon, it is then or eight inches long, whilst in the Nymphaeaceae and Papaveraceae it can hardly be said to exist at all. The canal of the style was first discovered by Malpighi. It is a continuous canal from the ovary to the style, which is the surface of the stigma. This canal varies in extent in different plants, in some being very narrow, and in others very wide. It is lined with a peculiar kind of cellular tissue, having a papillary character, and is covered with a viscus secretion. It is called by Bronnitztissus conduc- teur, or conducting tissue, on account of its supposed office in conducting the pollen tubes from the stigma to the ovule.

The style is often covered with hairs, which, on account of their supposed office of clearing the pollen from the cells of the antlers, have been called collectors. Sometimes these hairs are united together into a kind of cup around the stigma, as in Goodeniacese, when they form what is called an indusium.

The stigma is composed of the same kind of tissue as the interior of the canal of the style, but has a more spongy appearance. Its papilary character also is more evident, and the little swellings on its surface are often called stigma papillae. The stigma may become less distinct, and the style approaches the ovary. The stigma assumes a variety of forms, the distinction of which is often of importance in systematic botany. These forms depend principally upon the tissue of which its surface is composed. Sometimes the papillae break into the canal in the stigmas of Urtica urens. In other cases it is perfectly smooth, as in Nymphaeaceae. In rhubarb it is composed of
has Stigma Before the Ovules

In the flower, the anthers are also anomalous, as the apex or point of the carpellar leaf, it is said to be anther-like. Cruci-form the stigmata are opposite to the thecae. This order is explained by Dr. Lindley supposes that in this order there are originally four carpels, two of which being abortive, the stigmata are left opposite the placenta. Brown on the contrary supposes that the stigmata are originally two-lobed, and that the lobes have united on each side, and thus obtained their abnormal position.

For the function of the stigma see Impregnation, and Pollen.

STILAGA/C.E. A small natural order of plants belonging to the recembyrose group of apetalous Exogenous. They are trees or shrubs, with alternate, simple, stipulate leaves, the stipules being deciduous. The flowers are unisexual, mostly seated on amenorrhous spikes or racemes. Celys 5–5 parted; stigma 5–5 lobed, with a long stigid receptacle, with capillary filaments and 2-lobed anthers dehiscing transversely; ovary superior, stigma sessile; fruit a drupe with one seed, which is pendulous; the embryo is green, lying in the midst of the fibrous albumen.

This order was placed by DC among the natives of the East. In its relations this order is obscure. It has some resemblance to Urticaceae, from which it is distinguished by its enlarged disk, its peculiar anthers, and unisexual flowers. In these characters it resembles Hensloviaiceae, but they differ from this order in being hermaphrodite and having one seed. Many of the fruits of this order have a pleasant subacid flavour, and are eaten by the natives of the East Indies.

STILAGA'C. a genus of trees sometimes united with, at other times separated from, the genus Antidesma, belonging to the same family of Antidesminae, which by some botanists is called Stilaginaceae. The species are few in number, forming shrubs and moderate-sized trees, which are found in Madagascar and Mauritius, as well as in some of the Indian islands, and in India, where the species extend even to northern parts. The genus is characterised by having disagreeable flowers, the male having a 3- or 5-parted perianth. Stemens 2, 3, or 5, inserted in an annular disk with the rudiment of an ovary. The female flower has the perianth and disk surrounding the base of the ovary, the ovules single-celled ovary. Ovules 2, pendulous from the apex of the cell. Stigma sessile, 3, or 5-rayed. Drupes one-seeded, crowned by the stigma, with the nut ruge both inside and out. Albumen bony, scrobiculate. Cotyledons 2, the embryo in a furrow, surrounded by one or more fixed leaves. Calyx 5, usually crowded together. The leaves of Antidesma axeliana are also found in the Isle of France as an antidote against snake-bites. Cordage is made with its bark, as well as with that of A. zeylanica in Ceylon. The small fruits of both species are eaten but preserved: the fruit of A. pubescens (Silago), Bunias, and Dindra are eaten by the natives of India.

STILA/C.E. A small natural order of plants belonging to the monotypic group of monopetalous Exogenous. They are trees or shrubs, with the habit of a Phytoloma or a Sarcococca. The flowers are hermaphrodite, the petals are small but little from Stilaginae except in their 2-centred anthers, their erect ovules, and in the want of a hypogynous disk. Knuth, who formed this order, points out also its relation to Globulariaceae, and places it intermediate between that order and Seriphinae. The order consists of only two genera, Stilich and Campylotostachys, both of which are natives of the Cape of Good Hope. Their properties are not known.

STILICH, FLAVUS, was of Vandal origin, and his father had been a military officer in the reign of Valens. Constantius, on one occasion life and young women, you'd the vague eulogies of Claudian ([De Laud. Stilich., i.

42, &c.). According to the poet's account be distinguished himself in early life in a manner which announced his future greatness. He was of an unusually tall stature, and his appearance commanded respect. When he had scarcely reached the age of manhood, his father, Theodosius, made a treaty with Persia. He discharged his duties as ambassador, and maintained the dignity of the Roman empire; and after his return the emperor rewarded him with the hand of Serena, his niece, whom he had had for some time a future wife. (Chap. 4.)
On Stilicho.

Stilicho sought and moderate enough not to involve the two empires in a new war. This account

Alaric, who had in the meanwhile invaded, ravaged, and plundered Greece, had penetrated as far as Peloponnesus in A.D. 396. Stilicho went with a fleet to Peloponnesus; but Alaric escaped with his Gothic prisoners. Arcadiad, into the service of the East, and made commander of all the forces of Illyricum, as far as it belonged to the Eastern empire. (Zosim., vi. 7; Claudian, De Bell. Gett.) On his return to Italy, Stilicho began, in 397 A.D., his preparations for war; and he should have been reinforced by the presence necessary in Italy, partly to protect the northern and eastern frontiers, and partly to provide Italy with supplies of corn, which was entrusted to Gildo’s care by the emperor, who was the bitterest enemy of his brother. The Vandals entered Italy with six hundred men, but they were mostly veterans who had served under Eugenius. Gildo had assembled a numerous undisciplined body to repel the attack, but it was routed, and Masceali, with the aid of ten thousand horse, made a massacre. When they had terminated his life, they sought to revenge his murder. (Oras., vii. 36; Claudian, De Bell. Gildonico.)

This important campaign was completed in one winter. Soon after his return to Milan, Masceali, while riding by the Tiber, was met by a personage, identified as Claudianus. Claudianus was the ruler of the city, and he agreed to assist Alaric against the enemy. Claudianus was put to death for having violated his own laws. The army was led by his son, of whom Honorius was married to Maria, the daughter of Stilicho and Serena. (Claudian, De Nupt. Honor. et Maric.)

Alaric had availed himself of his position in Illyricum to strengthen himself, and secretly matured his designs, while extending his power, to the great detriment of the East and of the West. At length, in A.D. 406, he set out on his march against Italy. The immediate cause of this invasion is not known. When Alaric advanced towards Aquileia, Italy was in consternation, and the inhabitants of the near-by towns all rushed to the sea to seek refuge in some foreign land. Stilicho alone did not share their despair. But the difficulty was to raise an army, as most of the troops were engaged in Rhaetia. Stilicho hastened thither, and he was soon enabled to send the troops from Rhaetia to Italy. He also drew reinforcements from Gaul and other parts of the empire, and engaged some of the nations with whom he made peace to assist Honorius. Alaric appears to have been checked in his progress by the siege of Aquileia. He sued for peace, and promised to return; but before Stilicho returned from his expedition, in which he assembled his forces, Alaric, in 402, advanced towards the imperial residence of Milan. Honorius fled to Asta in Liguria, where he was besieged by Alaric, who did not venture to march upon Milan. It was not until the winter was advanced that Alaric, who had not arrived just at the critical moment with his army, forced his way through the camp of the enemy, and saved his sovereign. The Goths withdrew, and pitched their camp near Polenta, and while they were engaged here in celebrating the feast of Easter, Stilicho attacked them unexpectedly in their camp. A bloody struggle ensued, in which the barbarians were defeated (403). The whole camp of Alaric, and even his wife, fell into the hands of the Romans. Claudianus (De Bell. Gett.) compares this victory with that of Marcus over the Cimbri, although from other sources we learn that Stilicho gained the victory with great loss, while some authors even state that he was defeated. These latter accounts are the more probable, as Alaric is represented by his enemies as having no claim to an attack Etruria and Rome. This induced Stilicho, according to Claudian, to enter into negotiations for peace with Alaric, as he was unwilling to stake the existence of the empire on another battle. A peace was concluded, and Alaric retreated. Orosius (vi. 13) states that Alaric, who had defeated the Goths, sent a small corps of observation after him, and appears to have carried on a secret correspondence with some of the Gothic chiefs in Alaric’s army, so that he was informed of all that was going on. Alaric intended on March to make himself master of Verona, but when he approached this city he found himself suddenly surrounded by the imperial troops whom Stilicho had sent thither. Alaric is said to have lost here as many of his men as at Polenta, and he himself was nearly made a prisoner. Stilicho con-

cluded a fresh treaty with him, and allowed him to depart from Italy.

After the delivery of Italy, Honorius and Stilicho solemnized a triumph at Rome with great pomp and splendid games. The hostile machinations against Stilicho were still going on at the court of Constantine, and he saw no better way to secure his friends than by entering into an alliance with Alaric and engaging Honorius in a war with his brother. Stilicho intended to acquire for his sovereign possession of the eastern part of Illyricum, and Alaric was to assist him in carrying out this design, on condition that Honorius should be excluded from the imperial succession. (Zosim., vi. 39.)

The execution of these plans was interrupted, in A.D. 405, by the invasion of Radagaisus, who entered Italy at the head of several Germanic tribes, which formed an army of above 200,000 men. The safety of Italy rested again in the sword of Alaric, who again distinguished himself by expelling the forces from the provinces to Italy, and reinforced their numbers by fresh levies. But with all his exertions he could not raise more than 40,000 men, exclusive of some foreign mercenaries consisting of Huns under Uldin and Goths under Sarus. Radagaisus and his hordes crossed the Po and the Apennines, and marched into Etruria. Stilicho assembled his forces in the neighbourhood of Pavia. Many cities were pillaged and destroyed by the barbarians, but the siege of Pavia was decided by the wisdom of Alaric, who again sent troops from the provinces to Italy, and reinforced their numbers by fresh levies. But with all his exertions he could not raise more than 40,000 men, exclusive of some foreign mercenaries consisting of Huns under Uldin and Goths under Sarus. Radagaisus and his hordes crossed the Po and the Apennines, and marched into Etruria. Stilicho assembled his forces in the neighbourhood of Pavia. Many cities were pillaged and destroyed by the barbarians, but the siege of Pavia was decided by the wisdom of Alaric, who again sent troops from the provinces to Italy, and reinforced their numbers by fresh levies. But with all his exertions he could not raise more than 40,000 men, exclusive of some foreign mercenaries consisting of Huns under Uldin and Goths under Sarus.
at Bologna for his departure. The eunuch Olympius represented to the emperor that Stilicho was conspiring with Alaric, that he intended with his assistance to raise his son Eugius to the purple, and then that he designed to restore paganism in the empire. (Olympiodorus, ap. Phot. Cod., 80.) He also contrived to influence the soldiers at Pavia, who revolted, and on a given signal killed several of the officers, who were represented to them as the friends of Stilicho. As soon as the intelligence of the revolt at Pavia had arrived, Stilicho's friends advised him to march against his enemies; but he hesitated till it was too late. His friends, for the most part because they were afraid of indignation, had not the want of execution. At midnight, Sarus, the faithless Goth, made an attack upon Stilicho's tent, and cut down his guards. Stilicho escaped to Ravenna, and took refuge in a church. He was treacherously induced to come out, and as soon as he had retired he should be watched. Eucherius, who was waiting for him with a band of soldiers, on the 23rd of August, 408. His family and his friends were persecuted, and many of them put to death. (Zosimus, v. 34.)

The history of Stilicho is brought down to us in a manner which scarcely enables us to choose a due medium between the extravagant praise of Claudian and the charges of his enemies, or of such writers as were obliged to join in the general clamour that was raised against him after his fall. He is put forward as the 'man of the ancient Germans,' vol. i. book viii., sect. 2, 19, English translation; Gibbon, History of the Decline and Fall of the Roman Empire, chap. 29 and 30; C. F. Schultz, Flavius Stilicho, ein Wallenstein der Vor- weil, ein Beitrag zum letzten Theile der Rom. Geschichte, Munich, 1843. (Naumann.)

STILLING, Mer CURTHIUS, a celebrated German Pietist, born at Gründen, in Westphalia, 1718. His father William Stilling was a country parson, to whom he was so destined, but circumstances favouring his becoming a tailor, he chose that business, though he soon relinquished it for a situation as teacher at a school. Dissatisfied with this, he returned to tailoring, and continued it till he obtained a living by it, and took Richard, his private tutor to their children. He contrived to save a little money, which enabled him to pursue his studies, and went in consequence to Strassburg, and studied medicine there. It was here he became acquainted with Gothe, who took a great liking to him, and his books were a great comfort to him in his studies. He was a man of great goodness in several passages of the 'Dichtung und Wahrheit' (books ix. and x.). It was at Gothe's suggestion that he wrote his interesting autobiography (Lebensgeschichte), to whom he had often related it. Stilling published this on his first visit to Eidelberg, and in 1776 was appointed professor at the Kammerschule of Lautern, and in 1797 at that of Marburg, and in 1803 at that of Heidelberg. He died in Karlsruhe, 1817.

His reputation resided in diseases of the eye, and he is said to have restored upwards of 2000 persons to better sight. As a writer, he was very popular, and the sect of Pietists in Germany (somewhat similar to our Methodists) look up to him with great affection. The great element of his character was an invincible and intense faith in God and an immediate providence, ever at hand in the time of trouble, and which momentously preserved man from evil. The most celebrated of all his works is the 'Theorie der Geisterkunder,' which we believe has been translated into English. A complete edition of his works was published at Leipzig, in 1835, in 13 vols. 8vo., edited by Dr. J. Grollmann. (Stilling's Lebensgeschichte; Gothe's Dicht. und Wahrh. der Männer, etc., 1826.)

STILLINGE, EDWARD, son of Samuel Stillinge, was born at Cranbourn, in Dorset, on the 17th of April, 1635. He was educated at the grammar-schools of Cranbourn and Ringwood, and at St. John's, Cambridge. He entered the university in 1651, and took the degree of M.A. in 1653. After taking his degree of M.A. he was private tutor successively in the families of Sir Roger Burgoin, at Wroxhall, in Warwickshire, and of the Hon. Francis Pierrepoint, at Stowe. Stillinge, great as his reputation was, in 1657 he was presented to the rectory of Sutton by Sir Robert Burgoin.

Stillinge commenced his public life as the advocate of moderate, almost of latitudinarian opinions on ecclesiastical affairs. In the year 1659 he published his first work, which was entitled 'Irenicum, or the Divine Right of particular Forms of Church Government examined.' A second edition appeared in 1662, with an appendix on the Power of England. It is said that no particular form of church government is appointed in the New Testament, was thought by the high church party to savour of Presbyterianism; and in defence of it, there was, in 1663, the Bishop Burnet's, Stillinge afterwards retracted it. Stillinge himself says that 'there are many things in it which, if he were to write again, he would not say; some which show his youth and want of due consideration; others which he yielded too far, in hopes of gaining the Church of England to the 'Irenicum.' (Quotation in Orme's Life of Baxter, p. 626; and in Stillinge's Life, p. 12.)

The work on which his reputation mainly rests is his 'Origines Sacrae, or Rational Account of the Christian Religion,' which was published in 1662. He meant to have continued it, but died before he could do so. The addressees to the folio edition, published after his death, are of little value. This work is still one of the most valuable of the truth of the Scriptures, though it is more adapted to the theologian than to the general reader.

Stillinge was a fierce and indefatigable polemic. During the greater part of his life, he had his hands full of controversy with the Papists, the Nonconformists on the other. In the year 1664 he engaged at the request of Dr. Hengch, bishop of London, in the defence of the views maintained by Laud in his conference with Fisher the Jesuit. A work having been published which was in his view, entitled Theile zum Geschichte, (Moscow, 1663), the bishop requested the author to present arguments to the grounds of the Protestant Religion, which was received with great favour by the Protestants.

In 1666 he was presented by the earl of Southampton to the rectory of St. Andrews, Holborn, having been already for a time curate there. In 1668 he was appointed to the Garter chapelry in Temple, and also as chaplain in ordinary to Charles II. In 1668 he took the degree of D.D., and was nominated by Charles, in 1670, canon residuary of St. Paul's, and in 1678 dean of the same college. In the meantime he published his 'Discourse concerning the Idolatry practised in the Church of Rome, and the Hazard of Salvation in its Communion,' 1671; and other tracts against the Roman Catholics, and also against the Socinians, as well as a 'A Letter of Resolution to a party unsatisfied about the Truth and Authority of the Scriptures.'

In the year 1680 he plunged into a new controversy, by preaching before the lord mayor a sermon, on Philip iv. ii. 19, which was afterwards published under the title of 'Separation.' This sermon consisted of a violent attack on the Nonconformists, which was little expected from the author of the 'Irenicum.' Mr. Orme justly observes that 'the rector of Sutton, who wrote the 'Irenicum' when the Church of England was but a sect among other sects, was a very different person from the dean of St. Paul's exposing the unreasonableness of separation from an apostolic church in all its glory. The one publication breathes a spirit of moderation, and uses the language of equity; the other is emotional, and uncompromising.' (Orme's Life of Baxter, p. 632.) In this discourse Stillinge maintains the curious position that 'though the really conscientious Nonconformist is justified in not worshipping after the prescribed forms of the Church of England, and so sects, as if he did so, yet he is not less criminal in setting up a separate assembly.' The sermon was replied to by Owen, Baxter, Howe, and other eminent Nonconformists. Howe directed his attention chiefly to the above position, and added some remarks, entitled 'Servicing and Unservicing.' (Giving him some credit for piety, purity of motive, and general moderation, that the dean confessed 'that Howe had discovered gravely and piously, more like a gentleman than a divine.' (Roger's Life of Howe, p. 231-266.) Stillinge replied to his opponents in a large tracts 'The Unreasonableness of Separation,' 1681, in which he traces the history of Nonconformity; and Baxter rejoined in 'A second true Defence of the mere Nonconformists, against the untrue Accusations, Reasons, and History of Dr.
STILLINGFLEET, Benjamin, grandson of Dr. Stillington or Stillingfleet, bishop of Worcester, was born in the year 1702. He was educated at Gresham College, afterwards entered into holy orders, and held the livings of Wood Norton and Swanton, in Norfolk, at the time of his death in 1708. His widow was left with a very estranged collection of books.

Benjamin was so fortunate as to obtain a good education at Norwich grammar school, where he made considerable proficiency. In April, 1720, he entered as scholar at Trinity college, Cambridge, where he took the degree of B.A. in 1723. Soon afterwards he quit the University, and became tutor to the son of Mr. Wyndham of Felbrig, in whose family he remained till 1726, when he became a candidate for a vacant fellowship in his own college, but was not successful, owing, as he believed, to the opposition of Dr. Bathurst.

After this disappointment he spent many years at Felbrig, and in 1737 accompanied the son of Mr. Wyndham to the Continent. On his return to England the father of his old pupil settled on him an annuity of 100l., on which sum he retired to his paternal estate at Gresford, and remained there for three years. The friendship of Mr. Price, whose acquaintance he had made when at Rome, now enabled him to take up his abode in a small cottage near that gentleman, and to cultivate the real excellence of his nature. After this state of health first led him to pay attention to natural history, which he afterwards cultivated with great success. In 1759 he published a collection of Miscellanea Tracts on Natural History, which consisted of translations from the German of Linnaeus and his pupils, and consisted of the principles of that great botanist. Mr. Stillington's preface to this work did much towards rendering the Linnaean system popular in this country, and constitutes his chief scientific merit.

'A Treatise on the Principles and Power of Harmony,' published in 1771, is which is an abridgment of Tartini's Trattato di Musica,' was the only other work which appeared during his life: but he left for his death a manuscript, of a collection towards a General History of Husbandry, of which an analysis is given in his biography by Mr. Coke. Mr. Stillington died in London, on December 15, 1771, leaving behind him, besides his scientific reputation, the character of an excellent man, of a great poet and musician, and a most amiable and estimable man.

For further information concerning him the reader may consult Mr. Coke's very interesting work, 'The Literary Remains and Select Works of Benjamin Stillingfleet,' London, 1811.

STILLYNGIA, a genus of plants of the natural family of Euphorbiaceæ, so named in compliment to Dr. Stillington, known as an English botanist. The genus now includes and species of tree, one of which is the famous tall-tree of China. The generic character of Stillingia is:—Flowers monocious. Males aggregate. Calyx cup-shaped, crenulate, or bidual. Stamens two, inserted; filaments united at the base; anthers opening outwards. Female flowers solitary. Calyx truncate or trialled. Ovary sessile, 3-celled; each cell with a single ovule. Style short, thick. Stigmas three, simple, spreading. Capsule, globaceous, tricosoc. Coccis single seeded. The species consist of one tree or a branched shrub, native to the eastern parts of Asia and America, and likewise in Bourbon and Mauritius. The leaves are alternate, petiolate; petals biglandular at the apex. Male flowers usually crowded in terminal spikes, supported at the base by a biglandular bract. The female flowers below the spike; sometimes subsolitary on another branch.

Stillingia sebifera, or the tallow-tree of China, at one time attracted considerable attention, and was introduced into various European colonies in the East and West Indies. It may be met with in some of our hothouses, and is stated to describe the plant as common in his time about Calcutta, but that it did not yield any useful product, and was therefore only an ornamental tree, being in flower and fruit most parts of the year. It is found in China on the borders of rivulets, and is also cultivated in gardens. It grows to the height of 60 feet, having a trunk and branches like the cherry, and foliage like the black poplar, but which turns red in autumn. It was met with in China as a result of the late expedition, and seeds sent home by Dr. Cantor, which have been planted in the society's Garden at Chiswick. The fruit of this tree furnishes the Chinese with candles, and oil for their lamps. The seed vessels and seeds are bruised, and then boiled in water. The fatty particles rising to the surface are skimmed off, and converted into oil. To this is sometimes added some wax, which is melted down. In the proportion of three parts to ten of the tallow. The candles made with it are beautifully white. Sometimes they are red, by the addition of vermilion. These candles are sometimes said to be obtained from a Chinese tree, probably Lignustrum lucidum, which forms an external crust and prevents them running. This tallow is also employed in medicine instead of lard.

STILPLO (Στιλόπος), a philosopher of the Megarian school, who lived about the year before Christ 300. Respecting his life we know very little. He appears to have enjoyed the highest estimation among his countrymen both as a man and a philosopher. Polemecus Soter, when he arrived at Athens, endeavored to come to Egypt, but Stilpio refused, and withdrew to Agrina until Polemecus had left Megara. When Demetrius Poliorcetes took Megara, he commanded his soldiers to carry away the habitations of the native, and, with his eyes, to make the most of all the Greeks living. Cicero (De Fato, 5), apparently on good authority, states that Stilpio, who was naturally fond of wine and women, exercised such control over his passions, that no one ever saw him in any sign of intoxication.

As a philosopher, Stilpio, on the whole, followed the doctrines of the Megarian school, but he went further, and denied the objective reality of the ideas of species and genera. He asserted that the character of a philosopher's freedom lay in his theory he was followed by his disciple Zeno, the founder of the Stoic school of philosophy. Diogenes Laertius, in his account of Stilpio, Vol. XXIII.
(ii, c. 13), states that he wrote nine dialogues, which he characterises by the epithet 'frigid' (dry); no part of them is now extant.


STILT PLOVER. *(Pluvialis, vol. viii, p. 285.)*

STILTON. *(Huntingdonshire.)*

STIMULANTS or Excitants (in medicine), agents which increase vital action, first in the part to which they are applied, then of the system generally, and perhaps ultimately of all the parts of the body. and when this organ is a gland secreting an organ, a renewed or augmented secretion is observed. The nervous system seems to be the part which they chiefly influence, and through it the vascular, and in many cases the muscular. This is clearly seen in the simple effect following the employment of ammonia in cases of fainting, where the application of the vapour of ammonia, or its carbonate (sodium salts), to the nostrils, stimulates the brain, and so restores the heart's action, by which the circulation is resumed, and all paroxysms pass off as if by a premature use of them, than by delay, as the numerous relapses in fever testify. All persons recovering from severe diseases are almost in the condition of newly born children, in whom the heart's action is nearly and exclusively upon the vital organs. Even if it be not violently acted upon, but on the contrary they should be treated with the utmost gentleness and care. Sleep is a more useful restorative than any other. Stimulants are more necessary during the night than during the day, and are so generally employed in the following diseases that they must be abandoned, and stimulants substituted, is the nicest point that a medical attendant is ever called upon to decide; and nothing more clearly distinguishes the judicious practitioner than his correct determination of this point. It may be seen in the following cases; or, in the operculum: from which is useful in fevers:

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In many fevers the cinchona bark produces no abatement of the symptoms for which it is usually prescribed, as the stomach is too weak to digest it; but calamine or cayenne pepper given along with it, so rouses the stomach, that the febrile power of the drug is displayed.

Stimulants are of two classes: the former comprise medicinal substances; the latter, warmth, cold, electricity, galvanism, and mental agents, such as music (when lively), joy, hope, &c. Many of the latter class have been known for many years. A very popular one is the use of arsenic in small doses (Arsen. muriat.); of the others, the effects are too familiar to require notice, except to recommend the practice of encouraging the patient's hope of a cure; it is a fine tonic for all cases, not desperate, as cherishing this feeling greatly increases the chance of recovery. The former class are divided into permanent stimulants and diffusible stimulants, the effect of the permanent being slower but more lasting; that of the quick but transient. The first are used where a considerable and enduring power is wished to be imparted to the system, as in

The convalescence from acute diseases, the other where some great and impending danger is to be averted, as in cases of fainting, fits, or when sedative poisons are to be antagonised.

In these latter instances, ammonia, alcohol in some forms, or sulphuric ether, are commonly had recourse to. Permanent stimulants are generally volatile or essential oils, or pure, or in the combinations in which they exist in roots, barks, or flowers, and are often highly aromatic; malt liquors may also be classed with permanent stimulants.

The precise stage in the progress of fevers and other acute diseases, when the former should be abandoned, and stimulants substituted, is the nicest point that a medical attendant is ever called upon to decide; and nothing more clearly distinguishes the judicious practitioner than his correct determination of this point. It may be seen in the following cases: or, in the operculum: from which is useful in fevers:

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supports the pistil in some plants, as in *Capparidaceae*, *Lanaria*, and *Colutea*, it is called *stipes pistillii* by some writers, and by others *Gynaecophorum* and *Gynopodium*. Stipes is also applied to the side of some Mosses, as those of *Sphagnum* and *Andromedia*. The stalk that supports the pilot or cap in the higher forms of Fungi, as well as the part that supports the organs of reproduction in such Lichens as *Calicium*, *Compyra*, and *Baromycus*, is called stipes. The same term has been applied, though with much less propriety, to the petioles of the leaves of ferns.

**STIPULAE**, in Botany, are those organs which are found at the base and on each side of the axis of the leaves of plants. They are not of constant occurrence, not being found in all plants, but where they occur they frequently run along the edge of the leaf. These stipes, in *Malvaees*, &c. These organs are frequently very large, and present themselves in the various forms in which leaves are found. But they are always to be distinguished from the petioles as being part of the leaf-stalk. In many cases they are green, like the leaf; they sometimes have petioles, and are sometimes sessile and cut into teeth, lobes, &c. In the Mimosa the stipes frequently degenerate into hardened spines. In the family of *Polygonaceae* they are very large, and form a sharp thorn-like process sent out from the leaf. In the *Tropaeolum majus* they appear under the form of elongated filamentous bodies.

The size of the stipes varies greatly; sometimes they are very diminutive, and occupy but little space compared with the leaf, as is seen in the little bristle-like stipes of the bird-cherry and the wisteria scaled-like character they present in the buckthorn; whilst in other plants they are very long; and sometimes they seem to develop at the expense of the leaf, and perform its functions, as in the *Lathyrus aphaca*.

The duration of stipes varies. In some cases they are annual, and when they have served their striking impor- tation that they never existed. This occurs in the *Ameticaea*.

In many plants they continue on after the fall of the leaf, and this is especially the case in those with spiny stipes; it is also seen in many of the *Rubiaceae*, &c.

The length of the stipes is a matter of much altered by the adhesions that take place between them. In *Mag- nolia* they adhere together by their upper ends, and form a kind of sheath for the protection of the young buds. In some species of *Astragalus* the stipes of opposite sides they, and form a pair, and being aniseed with th. testa, a sheath around the stem, which is called an ocrea. The stipes in *Cucurbitaceae* assume the character of tendrils, and in *Tropaeolum majus* they appear under the form of elongated filamentous bodies.

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In many plants they continue on after the fall of the leaf, and this is especially the case in those with spiny stipes; it is also seen in many of the *Rubiaceae*, &c.

The length of the stipes is a matter of much altered by the adhesions that take place between them. In *Mag- nolia* they adhere together by their upper ends, and form a kind of sheath for the protection of the young buds. In some species of *Astragalus* the stipes of opposite sides they, and form a pair, and being aniseed with th. testa, a sheath around the stem, which is called an ocrea. The stipes in *Cucurbitaceae* assume the character of tendrils, and in *Tropaeolum majus* they appear under the form of elongated filamentous bodies.

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The duration of stipes varies. In some cases they are annual, and when they have served their striking impor-
rise to severe reflections on Alexander. There is every reason however to believe that he was more ambitious to obtain money, than anxious to obtain the latter. He obtained from the king a charter of the lordship of Canada in 1628, and from the council of New England a grant of all that part of New England between the rivers Kennebec and St. Croix, and the island of Stirling (now Long Island, in the state of New York), in 1635. He made vigorous efforts to settle this island, and his eldest son contracted the disease which carried him to his grave before his father, by the excessive hardships he had undergone in the attempt to make a settlement there, or the St. Lawrence. What property Alexander did accumulate seems to have been dissipated in these attempts; for the family estates in Scotland were snatched by his creditors from his third son. It is however perfectly clear that he continued to hold large grants both of property and honours through the royal favour, and the temper of the times he lived in was not such as to allow such acquisitions to pass without criticism. While busied with the Nova Scotia project, he obtained the privilege of coming for Scotland a sort of base copper-money, called 'turners.' Douglas mentions, in his 'Peerage,' that Alexander having built about this time a large house in the town of Stirling, on which he inscribed his motto, 'Per mare, per terras,' his son had inserted into the porte-cochere allusion to his making money by poetry and copper-coining. Besides the large grants of land in America, the king granted to him charters of the barony of Mensties, 1628; of the parish of Large and Tuliculaire, 1632; of the barony of Tullicultr, 1634; of the barony of Gartmore, 1636. He was sworn a privy-councillor, and appointed secretary of state for Scotland in 1626; made keeper of the seal, 1627; a commissioner of Exchequer, 1628; and an extra judge of the court of session in 1651. Viscount Stirling and Lord Alexander of Tullibody, by charter, dated Windsor, 4th September, 1630, and Earl of Stirling, Viscount Canada, and Lord Alexander of Tullibody, by patent dated at Dalcross, 4th June, 1632, William earl of Stirling died on the 12th of February, 1640. By his wife Janet, daughter of Sir William Erskine, commissary of the bishopric of Glasgow, he had seven sons and two daughters. The last of his male descendants, Henry the fifth earl, died without issue in 1749. The earl of Stirling, who held a command in the revolutionary army of America (whose representative still votes under protest at each election of Scottish peers), claimed the titles as descendant of Andrew Alexander, younger brother of the great-grandfather of the first earl, details having been granted to 'heirs-male of the name of Alexander.'

Kippis's _Biographia Britannica_; Horace Walpole's _Catalogue of Royal and Noble Authors_; Park's edition; _Douglas's Scottish Peerage_; _Wood's edition_; _The Earl of Stirling_, by the Rev. R. M. Hamilton (the Muse).}

**STIRLING.**

JAMES, an English mathematician of considerable eminence, but of whom, except the works which he published, scarcely anything is known. He must have been born near the end of the seventeenth century, and he was a student in the university of Oxford; in 1726 he was elected a fellow of the Royal Society, and his death must have taken place subsequently to the year 1764.

Mr. Stirling's first work is entitled 'Lineum Tertii Ordinis Newtonianae, sive;' &c.: this work, which was published at Oxford, in 1700, in 1717, contains a commentary on Newton's tract on the subject of lines of the third order. In this tract it is shown that all such lines may be expressed by five different equations, of the third degree, between five variable quantities x and y; and that of these equations one, which consists of terms involving the first three powers of x and the two first powers of y, comprehends sixty-five species of hyperbolic curves. Stirling discovered that the same equation contained two additional species, and the _Abbe De Gas (Usage de l'Analyse des Descartes) subsequently detected in it four others which had been overlooked by Stirling, probably because he directed his research by the algebraic method of trial and error. The English mathematician has the honour of being the first who observed, if the value of y in the given equation be found in an infinite series of terms containing descending powers of x, and if to the second term only of such series for the value of y, there is obtained an equation of the first degree, which determines the position of a rectilinear asymptote to the curve: that on taking two terms, there is obtained an equation of a curve, which may be considered as a generalization of the original curve, and which appears nearer to it than the rectilinear asymptote; and so on. It may be observed however that the division of curve lines into classes and species is arbitrary, Newton, Euler, and Cramer having made the number of curves of the same differential equation in a different manner, and when the equation of any curve is given, the rules of analysis enable the mathematician to determine immediately its tanscients, asymptotes, normals, and 'singular' points.

The work which contributed most to Stirling's reputation is an attempt to determine by graphical solutions the summation of series and the interpolation of series. This work was published in London, in 4to, in 1730, and in the first part of it there are investigated general formulæ, expressing the sum of series in which each term in a series being multiplied, the product is equal to the next following term: the factor itself is in the form of a series consisting of terms arranged according to the ascending or descending powers of a variable quantity; and for this variable are to be substituted different numbers increasing from unity. When the given series is not susceptible of having its sum expressed in finite terms, the factor is an infinite series, and then the formula expressing the sum is also an infinite series; but being highly approximate, it is often used with very good effect, and can be brought very near approximation to the value of the given series.

The second part of the work relates to the interpolation of terms between those of any given series: the values of the terms are given in certain cases, and the various formulæ are applied to the computation of the series by means of Newton, and there are added several theorems for facilitating the processes by which they are obtained. There are also given various formulæ for approximating to the quadrature of curves by the method of equidistant ordinates.

The first edition was published in London in 1730, but the second edition of the 'Methodus Differentialis' was published in 1738.

**STIRLING.**

[STIRLINGSHIRE.]

STIRLINGSHIRE, an inland county of Scotland. It is bounded on the north by Perthshire, from which it is separated by several parts separated by the river Forth; on the north-east by Clackmannanshire and the county of Forfar, and on the south by Lanarkshire and a detached portion of Dumbartonshire. Stirlingshire is divided into seven districts; the south-western, which is the Forth near Stirling, the nearest breadth at right angles to the length is from the town to the county of Lanarkshire and a detached portion of Dumbartonshire, from which it is separated by the county of Perthshire; the county is estimated at 502 square miles, or 321,280 acres, of which 13 square miles, or 8320 acres, are in lochs. (Macculloch _Statistical Acct. of the British Empire_.) Macfarlane's estimate is 560 square miles. (Descriptive of Scotland.)

The population of the county at the different enumerations made during the present century was as follows: 1801, 50,693; 1811, 58,174; increase 14 per cent. 1821, 65,376; increase 15 per cent; 1831, 72,021; increase 11 per cent; 1841, 78,546; increase 6 per cent. That is to say, the number of inhabitants to a square mile, according to the census of 1831 (which we retain to facilitate comparison) and taking MacCulloch's estimate of the area, was 145; but at that time the thirteenth county of Scotland in amount of population, exceeding the county of Perth, which is 31 miles from Edinburgh Castle in a direct line west of the north-west, or 35 miles by the road through Linlithgow, Falkirk, and Bannockburn. The county is included between 55° 54' and 55° 30' N. lat., and 4° 40' and 4° 40' W. long.
trinity of the Grampians, and separates Loch Lomond from Loch Chon and Ard, in which the Forth rises. Of the range the principal mountain is Ben Lomond; 'on the north it is Fort'mous; on the south, set out from the inn of Rovardown, on the bank of the River Leven, the ascent is easy at first, walking over a space of three miles. When you reach its conical summit, overtopping every surrounding eminence, and elevated 3000 feet above the sea, you are above all obstacles, and the descent of mountains like the billows of the stormy ocean; and on the south you have presented before you, as on a map, the riches and beauty of the central district of Scotland from the Western Isles to the Frith of Forth. (New Statistical and Geographical Description of Scotland.)

In the southern Highlands, in the neighbourhood of Edinburgh, and joins the Forth and Clyde Canal at Port Downie, near Falkirk, about four miles from Grangemouth; its whole length is 314 miles, partly in this county. It enters the county by a fine aqueduct bridge over the valley of the Avon, and passes near its junction with the Forth and Clyde Canal through a tunnel nearly 1000 yards long cut in the solid rock. It was begun in 1818 and finished in 1822, and is used for the conveyance of coal, manure, and passengers. The Edinburgh and Glasgow Railway passes through this county, having its course parallel to that of the Union Canal and of the Forth and Clyde Canal. The Act for this railway was obtained, and the railway itself began, in 1838. The market of Edinburgh commences at the height of 1500 feet, and presents many indications of a volcanic origin. The Campsie Hills, which constitute part of the group, and skirt the valley of the Kelvin, consist chiefly of large tabular masses of trap, the geological position and character of which shows that there is to be a series of limited areas of gunnocks, Fintry, and Kiklithy hills are chiefly trap or granite: the face of these is broken with crevices and gashes. These trap rocks appear to have penetrated through the old sandstone, and through the limestone and the coal formations, which cover the Ash-beds by the old red sandstone.

The main part of which the country is divided between the Lennox hills to the south and east, and is drained by the Kelvin, a tributary of the Clyde, and by the river Carron from the Ochil Hills to the north. The greater part is mountainous, and yields coal, ironstone, freestone, and limestone in considerable quantity. Silver and coal were formerly obtained in the detached part of the shire which constitutes the parish of Alva. The cairns or dales are permanently occupied by the latter formations or by alluvium.

Hydrography and Communications.—The county belongs partly to the basin of the Forth and partly to that of the Clyde. The Dudding Water, one of the principal affluents of the Forth, is a river that lies entirely within the county, rising from the southern slopes of Ben Lomond, and forms for five or six miles the boundary of the county. It then enters Perthshire, but again turns to the west, and enters with the upper principal head of the Forth; and except for a short distance in the parish of Kippen, where its course wholly belongs to Perthshire, and again near Stirling, where it wholly belongs to Stirlingshire, forms the northern boundary of the county till it receives the Avon, which forms the eastern boundary. Its course in the neighbourhood of Stirling is very winding. Its Stirlingshire tributaries are all small; the Bannockburn, the Carron, and the Avon are the principal. Some more important streams, the Kelvin, the Allan, and the Devon join it on the opposite bank. Up to Stirling bridge the Forth is navigable for small sailing-vessels and steam-boats. At the junction of the Carron with the Forth is the small port of Grangemouth. The Forth abounds in pike, perch, and eels; trout and salmon are numerous, but are however abundant in the streams that flow into it.

No part of the Clyde is in this county; but the Endrick and its feeder, the Bannockburn, which drain the chief part of the parish of Fintry it falls over a rock 90 feet high, presenting, when the waters are swollen by a flood, a magnificent cascade: there is a second smaller fall lower down.

The 'Great Canal,' which connects the Forth and the Clyde, has part of its course in this county. Commencing in the Forth, or rather in the Carron, at Grangemouth, it runs along the south-western detached portion of Dumbartonshire; its whole length is 35 miles from Port Dundas near Glasgow 374; and the main line of its course belongs to Stirlingshire. The canal is on the average 57 feet wide at the top, 27 at the bottom, and nine feet deep; it has 39 locks, and adJoins vessels of 90 tons burden. The manufactures of Glasgow are conveyed by this canal to the eastern parts of the island; and goods of various kinds conveyed back. This canal was begun in 1768, opened to a certain extent in 1775, and completed in 1790. The Edinburgh and Glasgow Union Canal, and the Forth and Clyde Canal, enter the county at a railroad bridge near Grangemouth, and pass through the parish of Slamannan, before it enters the county, and its two small branch lines enter the county.

The Edinburgh and Glasgow Railway, running from the termination of the Ballochney Railway in Lanarkshire to the Forth and Clyde Union Canal at Linlithgow, has part of its course in this county; its length is about twelve miles and a half; its south coast line was opened in 1838. The road from Edinburgh to Stirling, and from thence to Perth and the north of Scotland, enters this county on the east side at Linlithgow bridge, over the Avon, and runs by the villages of Stirling, Milngavie, and Camelon, just beyond Falkirk, a road branching from this to the left runs by Kiklithy and Kirkintilloch to Glasgow, with a branch from Kirkintilloch to Dumbarton. The road from Stirling to Glasgow falls in with this road between Camelon and Kiklithy; and a short distance, turns off to the left, and runs by a more direct line to Glasgow.

Soil, Agriculture, &c.—The hilly district of the centre and the highland tract of the north-west, with the lower part of the Forth valley to the east of the Forth, is almost everywhere divided into tiny, four-foot, portions, and one is cut every year, so that the whole are cut every twenty-four years: they produce coarse-wood, not timber, except that a few trees are left at each cutting for standing timber; the bark is an important product of the produce, and a great quantity of small wood is annually consumed in a manufactury of pyrogallous acid and dye-stuffs established in the parish. The products of the manufactury are consumed in the print-works round Glasgow. 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or in the neighbourhood of the Forth. The soil in the Strath of Endrick is a rich brown loam: along the Forth are nearly 3000 acres of deep moss, called 'Flinders Moss,' under which there is a rich clayey soil, capable of producing good crops. The low flat moss-lands, of which this is the common name, and which extend along the Forth all the way to Stirling, distant sixteen miles, are supposed to have originated from the destruction of the forests cut down by the troops of Severus in his war against the Caledonians. Trees of immense size are frequently dug out, lying in various directions, and having the marks of trunks which cover them. Improvements in agriculture have been generally introduced into this part of the county: a five-shift rotation of crops is generally adopted in the best lands, and draining has been extensively practiced. Two-thirds of the parish consist of moor-lands, partly between the Forth and the Endrick, partly to the south of the Endrick. The small black-faced sheep, improved by the occasional introduction of Linton and Lammermoor rams, are general; but a few Leicesters are kept on the better farms. The Ayrshire breed of cattle is prevalent, though some of the mongrel breed formerly in use are still retained.

In the lower ground which separates the highlands from the Lonneks Hills, and in the straths or valleys of the Forth, north of Stirling, and of the Lennox, south of them, the quantity of arable land is greater in proportion. The lower grounds are commonly divided into the caise or valley, and the dryfield or upland slope between the valley and the moor-lands. Oats and hay form the principal crops: barley and beans are grown to a considerable extent; and potatoes, cabbages, tares, beans, and wheat in a smaller proportion. A six-year shift is the common rotation. Draining and other improvements have greatly extended, and are still extending. Milch-cows are now numerous; the Ayrshire breed is preferred. The butch market of Stirling supplies a ready market in Glasgow. Scarcely any cheese is made except for home use. Many calves are reared, though none are fattened. The hills are occupied as sheep-walks, as in the highland district; and the black-faced sheep from Tweeddale are prevalent. There are some plantations upon and around the Campsie Hills of Scotch fir, larch, spruce, ash, elm, birch, oak, lime, and plane.

The eastern part of the county is the most fertile, and, in an agricultural point of view, the most important. It comprehends the caise or valley of the Forth below Stirling, the soil of which consists principally of a bluish clay mixed with sand. There is comparatively little waste land; the soil is almost wholly occupied in tillage or in plantations; and the greater facility for cultivation, combined with the habit of the navigation of the Forth has tended to the improvement of agriculture. A six-year shift is common; and the produce in wheat, barley, and beans is larger in proportion to other produce than in the more western districts of the county. Gardens and orchards are numerous and productive: the soil is particularly adapted to pear-trees. The horses reared are of superior description.

Rents vary. Arable land in the highland district brings about 23s. per acre, but the rent of a farm is commonly calculated by the number of sheep which it will keep, and is about 3½ to 31½ acres. In Drymen, adjacent to the highland district, the inferior arable land lets at from 10s. to 13s. per acre; and that of better quality at 21½ acres: the rent of a cow's grazing in the best land is 31½ acres; and of a hill-fed sheep 5s. or 6s. From the various quality of arable land, great variety of rent is given; perhaps 2½ may be taken as the average rent of arable land in the whole shire: in a few instances it rises to 4½, and in some places falls as low as 7s. Leases are commonly for nineteen years. Old rents are common in the lower part of the caise or valley of the Forth, below Stirling. The greatest fairs or markets for cattle in Scotland are held near Falkirk in this county: they are known as 'Falkirk Tries.'

Wild animals abound in the wastes of the highlands. Ptarmigan and white hares are found on Ben Lomond, and are common. Roos are in by the late a whole enormous in are strictly black and common in a few roos are seen: otters, weasels, stoats, polecats, foxes, and squirrels, are numerous; as are the smaller birds of prey. Pisk and perch abound in the lochs in Strathblane parish, and one of them is a very fair. The streams generally contain trout, and in the lower part of the Endrick the salmon is abundant. Badgers and wild-cats, formerly abundant, are now extinct.

Divisions; Towns.—The shire contains twenty-twenty parishes, and part of five others, viz. Logie, part of which is in Perthshire, and another part in Caithnessshire; Stirling town consists of the town of Clack and the town of that name, which are partly in Perthshire; and East Kilpatrick, which is partly in Dumbartonshire. It contains the royal burghs of Stirling, the parliamentary burgh and town of Falkirk, the port of Grangemouth, and a number of thriving manufactory villages. Falkirk is described elsewhere. [Falkirk.]

Stirling, which gives name to the shire, is near the south bank of the Forth. A castle or tower was early erected here, under the protection of which the town grew up; but from its commanding the passage of the Forth, rose early into importance. The name was at first Styrwyline or Styrweling; and has been Latinized by Buchanan and others, Stirlinum. It was made a royal burgh; its ancient and picturesque burgh, a town, is that of 1502; and the fourteenth century, Stirling Castle was considered to be one of the four principal fortresses of the kingdom; and is one of four which are still upheld by virtue of the article of the Union. It appears conspicuously in the history of the English wars, and was frequently the residence of the Scottish kings.

The parliamentary burgh of Stirling comprehends the town of Stirling proper, the hamlet of Newhouse, and the village of St. Ninians, which are now united to Stirling by an act of 1819 (which also included within the municipal jurisdiction) the towns and immediate vicinity, but does not extend to Newhouse or St. Ninians, and indeed does not include the castle and government lands, and some lands held in trust by the Scottish nation, which are in the nature of a munition of war. Of the latter, some portions of the municipal burgh are north of the Forth, and not within the parliamentary limits. The parish again is not exactly coincident with either the municipal or parliamentary burgh. The census of 1831 gave to it 892 houses, inhabited by 1904 families; 2 houses building, and 14 uninhabited; with a population of 8556, of which but a small part was agricultural. The parish of St. Ninians had 1706 houses inhabited by 2055 families, 10 houses building, and 25 uninhabited, in a population of 6757, but from the great extent of this parish, a comparatively small part is comprehended in the parliamentary burgh of Stirling. The population of this included part may be estimated at about 6000.

The county town of Stirling is irregularly laid out; a winding street or road, not lined with houses throughout, leads to the bridge over the Forth, and by that towards Perth. The Castle-hill, a somewhat long and narrow ridge, is on the north-west side of the town, toward which it rises gently, but presents a steeper slope on the other sides, and is on parts quite precipitous. The prospect which it commands is very fine. The castle presents a singular assemblage of buildings, some of them ancient, but altered and adapted to the purposes of modern life. The palace, built by James V., is now converted into a barracks; and the adjacent hall, built by James III. for the meeting of the Scottish parliament, is now a riding-school. Adjacent to this is the chapel royal, built by James III., and rebuilt by James VI. (1 of which is ruinous), and is a noble structure of great solidity and armoury. South-west of the castle is the space formerly occupied by the king's park and garden: it is surrounded by an old wall, but is chiefly occupied as pasture or cultivated ground. A series of concentric polygonal mounds are seen in the garden, said to be the remnants of some forgotten diversions; a hollow, called 'the valley,' is said to have been appropriated to jousts and tournaments, which the ladies viewed from what is still a craggy pyramidal mound, called 'the ladies' hill.' To the north of the castle are a series of modern remains, called the Dowan or Gowans hills, gradually descending towards the plain; the remotest of these remains, near the bridge, was the ancient 'heading hill,' or place of execution for state criminals. The castle contains a deposit of arms, and is occupied by a regular garrison.
The more ancient streets of the town are narrow, winding, and in many places ill-paved; with decayed houses: but several streets have been much improved in the present century, and are lined with good, Dampier and the different roads out of the town are lined with neat modern villas, forming a favourite place of retirement for gentry and persons of business. The town is lighted with gas.

In old church, a fine Gothic building, stands near the sea. It was a many tower of dismembered English architecture. The town has been rebuilt Cosmary, to have an Inner Wall, a period less than the rest of the building. It is lofty, with fine piers and arches: the east end is an octagon, with a stone ceiling. South of the church is Gowane's Baptist, built in three, and near one of the parish's ancient old houses of the earlys of Mar, called 'Mar's Kirk,' deserving of examination. There is another old house, Argyle's Lodging, of the same period. The old edge over the Forth is an inconvenient structure of stone, mounted with four towers, by the people of Fifeshire. Here are dyes-houses for yarns, home-made cloths, and flax, goss-ameres, and breweries. Considerable trade is carried on in corn, wool, coals, bricks, tiles, lime, and wood. The port is large, and vessels are said to be engaged in the trade to Stirling, and are sent by sea to unload or they sail from, and trade with the enlarged market, to be carried on with an immense trade. The circuit court for Stirling, Croxman, and Kames shires, the sheriff's court, and the burgh court held here.

The burgh council, under the act 3 & 4 William IV., cap. 21, is a body of twelve, four by ties, a treasurer, and fifteen other councillors. The corporations are the guild or benevolent, seven incorporated trades, and four other bodies, called 'tendered committees.' The burgh revenue is £11,000; per annum: the debts amount to about 11,000l. Stirling is a port of call; ships come from Norway, Canada, and the Baltic, laden with wool, pitch, tar, and manganese-ore from the Baltic; cheese, park, madder, and geneva from Holland and Belgium; and goods of all descriptions from London, Hull, Newcastle, Arbroath, Montrose, Dundee, and Aberdeen. The exports are, coal, linseed, hemp, clay, brick, cordage, and cotton and woollen goods. Steam and other vessels are built, and sail-cloth and rope manufactured.

The parochial schools are taught in a neat building in the cottage style, containing two good school-rooms, a library, and dwellings for the teachers, with a large playground. There are a female missionary society, an auxiliary Bible society, and a temperance society.

Kerse House, the seat of the Earl of Zetland, near Grangemouth, is in the Elizabethan style, and is in the midst of a finely wooded park.

Laurieston is a mile and a half from Falkirk, on the Edinburgh road; the inhabitants are chiefly employed in nail-making, weaving, and agriculture. The village is regularly laid out, with a neat church, and three schools, and a Reformed Presbyterian meeting-house.

Cameleon is about a mile west of Falkirk, on the Glasgow turnpike road. It has a handsome new church and two schools, one built by subscription. The inhabitants are chiefly engaged in nail-making. Both Laurieston and Cameleon are in Falkirk parish.

Campsie is a large parish in the southern part of the shire. The population in 1831 was 3,109, and is now about 4,000; it has increased nearly 300 in the last ten years, and 500 in the last five. The streets and roads are improved, and the trade is stimulated by the introduction of manufacturers. The principal town is Lennoxtown, which contains nearly half of the population, and has a population of about 800.
are some other villages of tolerable size. There are three places of worship in the parish, namely, a large and handsome new church-building, a meeting-house, and a Catholic chapel, all in Lennox-town which is a large, handsome new school-house. The Catholic chapel consists of Irish, engaged in the cotton-printing, the staple branch of industry in the parish. The most extensive print-work is the Lennox mill-field, which lately gave employment to nearly 700 persons of both sexes and of all ages. The field employed, in the full time, the burn field 150, and sometimes more, making a total of at least 1229. The are two bleach fields which employed about 130 persons; and a work for manufacturing linen, prussiate of potash, prussian blue, &c., which employed 180 persons. This work is also a cotton-printing establishment.

The state of education in the parish has been very low, but is improving. There are three parochial schools; a large school, not parochial, and an infant-school held in the new school-house at Lennox-town, built by subscription; and five or six small private schools. The number of children under instruction in day-schools is about 520, besides those at evening-schools and Sunday-schools, and those taught during work-hours in Lennox mill. There are two subscription libraries.

Kilsyth parish adjoins Campsie on the east. The population in 1831 was 4297, and has been nearly stationary since, except that it received a temporary augmentation from the persons employed in the construction of the Edinburgh and Kirkcudbright railway. It is at the junction of the roads from Falkirk and Stirling to Glasgow. It is irregularly laid out, and the houses are small and mean-looking; the streets are lighted with gas. The parish is one of the most manufacturing in Scotland, but not so far off small for the population; a new church has been built in the village of Hanton. There is a meeting-house for the Dissenters of the Relief church, and there is a small Methodist chapel, and a Mason lodge occupied as a place of worship for the Masons' brethren. The inhabitants are chiefly hand-loop weavers employed by the manufacturers of Glasgow; two factories have been commenced lately. There are in the parish a small sickle manufactuary, a paper-mill, and a brick and cement works. The Forth and Clyde Canal and the Pacific Railway have had a great effect on the trade of the parish, and a. small number of ironstone, ironstone, and coal are dug in the parish. There is no weekly market, and the two yearly fairs are of no account. Kilsyth has a post office.

Kilmarnock, A.D. 1256, into a burg of barony; it has a belfry and four councillors elected annually, who hold monthly courts for small debts and petty offences; all tenants and proprietors of houses of 5s. yearly rent are entitled to vote at the election. There are three churches, one in the immediate vicinility of the town; and there are two other schools; about 500 children are under daily instruction. There are a savings' bank, three benevolent societies, several small libraries, and a temperance society.

Kirkcudbright is a parish adjacent to Kirkcudbright parish, on the north-west. It contains the village of Carnon, where is the most extensive iron foundry in Europe, about two miles north of Kirkcudbright. There are five blast or smelting furnaces, four cupola furnaces, and twenty air furnaces; besides mills for grinding fine-clay, boring cylinders, grinding and polishing the metal, &c. Water and steam are the moving powers employed. The goods manufactured are machinery, agricultural instruments, and warlike implements, as cannon, ordnance, &c. (of which their name is from this place), mortars, shot, and shells. These works are conducted by a company, the shareholders of which hold and work extensive coal, ironstone, and lime pits; and have about twenty vessels to export their goods to London and elsewhere, and besides coal, iron, and lime. The Carvon works employ about 2000 persons.

Denny parish is adjacent to Kirkcaldy parish, on the west. The population in 1831 was 3643, and has since increased to about 4500. It contains four villages, Denny, Haga, Denny Burn, and Lothian. Denny has the parish church with a turretled steeple at the west end 76 feet high, and a United Secession meeting-house. The houses are generally of modern erection, of two stories, with garrets, slated roofs, and sash windows. A new school is being erected. There is a church connection going to the establishment at Haga (to which a district has been attached as a quadra sacra parish), and a United Secession meeting-house at Lothian. There are in the town two mills for grinding clay and mill for the manufacture of hair, &c.; two mills for the manufacture of turpentine, chamois, and lime, &c.; a dyeworks, a saw-mill, and some small corn and pot-barley mills; also two distilleries, a brick-works, calico-print works, a pyrogallic acid manufactuary, and a spade manufactuary. Most of the mills are on the Carron, from front to front, and are surrounded by large and elegant gardens and grounds. Among them are about 200 in adjacent parishes are (or were lately) employed directly or indirectly by the manufactories and about 100 of these are connected with the calico print-wrorks besides the manufacturing population, about 90 as weavers, about 30 as bleachers, and about 90 as printers. Denny has a post office and a good railway station.

Bairdon parish is in the western part of the county. The population in 1831 was 2957, of whom about 1709 were school-children. Bairdon parish is 19 miles from Glasgow, and as many from Strathclyde. The census of 1841 makes the population of the town 668. The village is neatly built and clean, and the houses are lighted with gas from the adjacent cotton-works, and supplied with water from the Edinburgh and northern railway, and are connected with the railway by a fine road. It is approached by many and splendid approach roads from 300 to 400 looms were lately at work, making cotton, &c. There are two schools, one for the boys, another for the girls, and a large number of residents. There are a parochial school and a private school, with about 300 scholars; five Sunday-schools, with about 150 scholars, and a respectable subscription library.

The parish of Alva forms a large and important part of the county; the village of Alva is on the river Devon, between Stirling and Kinnross. The woollen manufacture has long been established in the parish; the earliest article made was worsted. There are seven cotton-mills in the parish; also a flax-mill, a paper-mill, a flour-mill, a wool-mill, a snuff-mill, and several coal-mills giving employment altogether to about 1000 persons. There are a number of trades and manufactures. There is a very considerable trade in the parish, and the cotton trade is the principal. The parish church, a good building, is in the village: the parish church is supported, and is a very fine building. The village consists of a row of handsome houses, fairly built, with two stories and a garret, ranged on one side of the road, with their gardens on the other side. It is a pretty village, and has a good church-school, and a school-room and house for the teacher: this school has about 60 day scholars, and 50 to 60 evening scholars. There is also a Sunday-school and a subscription library. The parish church is a plain neat building, mostly a new church.

In Straithblane parish, on the south-west side of the county, are a calico print-work and two bleaching works, which...
give employment to above 860 persons. There are one pa-

trochial and two private schools; a young men's society,

combining the double object of a religious meeting and a

mechanics' institute; a parish library; a savings-bank; and

Bible, missionary, and temperance societies.

Menstrie, with a population of 500, has a woollen-manu-

factury and a distillery; and the pretty village of Bridge

of Allan, with a population of 300, is restored to for the sake of

the mineral springs of Airthook. Both are in Logie parish,

which is on the north side of the Forth near Stirling.

**Divisions for Ecclesiastical and Legal Purposes.**

The twenty-six parishes wholly or partly in the shire ar

are arranged in the following:

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Larbert and Dunipare are for ecclesiastical purposes united: there are several quoad sacra parishes which have been formed by the subdivision of the above. The Seceding churches of the associate synod are chiefly in the presby-

teries of Glasgow, and of Stirling and Falkirk; those of the

Relief kirk in the presbyteries of Glasgow and St. Ninians; and those of the Reformed Presbyterians in the presbyteries of Edinburgh and Glasgow.

Virtually the Scottish church was episcopal, the parishes in the eastern part of the county were in the diocese of St.

Andrews; and those in the western and southern parts in that of Glasgow; Kilpenn was in the diocese of Dunkeld, and Alva in that of Dunblane. On the erection of the diocese of Edinburgh by Charles I., A.D. 1633, the parishes in the diocese of St. Andrews, except Lecropt and Killearn, were subtracted, and placed under the jurisdiction of the newly created bishop. The Rev. Ebenezer Erskine, one of the leaders of the great secession, and founders of dissent in Scotland, was minister of Stirling, and was deposed from his charge by the General Assembly in 1738. His influence led to the secession of a great number of persons in this shire.

The circuit court of justiciary, and the general quarter-

sessions for the county, are held at Stirling. Ordinary and

small debt sheriff courts are held weekly at Stirling and at

Falkirk: there is a sheriff-substitute at each place. Sheriff's small-debt circuit-courts are held quarterly at Drie, Bathgemy, and Lennoxtown, and once a month at Balfon. There is a county and burgh prison at Stirling for debtors and criminals, but in the Inspectors of Prisons' Fourth Report (Part Papers for 1839, vol. xxvii.) it is described as being one of the worst in Scotland; the discipline and general management were altogether very bad, and the keeper quite unfit for his place. The average number of criminal pri-

soners in the year ending 1st October, 1838, was about 26 males and 7 females; of debtors about 3, almost entirely males: the average number for the year ending Michaelmas, 1839, was from 42 to 43 criminals (27 males, and 15 to 16 females), and from 3 to 4 debtors, all males. There is a small burgh gaol at Falkirk, in which there were, on an average of the year 1838-9, 4 criminals, chiefly men. There are small lock-up houses at Alva and Kilsyth. Those at

Falkirk and Kilsyth are altogether unfit. The police of the county is altogether insufficient.

The county returns 6 members to parliament: the number of electors registered in 1835-6 was 2092; viz. 863 sole or joint proprietors, 12 life renters, 1025 leaseholders, or tenants paying a gross sum of 300l., 36 husbands voting on their wives' qualifications, 35 virtue by virtue of office, and 34 with joint qualifications, 1044 tenant of the free roll; and 15 freeholders: 1839-40 the total number of electors was 2323, viz. 993 proprietors, 127 life renters, 1039 leaseholders, &c., 40 husbands, 38 officers, 5 with joint qualifications, and 6 freeholders from the old roll; show-

ing an increase in 1839 of 232 votes at Stirling. The parish of Alva is, for parliamentary purposes, attached to the county of Clackmannan, but for judicial purposes re-

mains attached to Stirlingshire.

Stirling returns a member in conjunction with Cupross, Dunfermline, Inverkeithing, and Queensferry. The number of voters at Stirling was, in 1835-6, 497; in 1839-40, 471; showing a decrease of 26. For the whole district the number was, in 1835-6, 1290; in 1839-40, 1141; showing a de-

crease of 79. Falkirk returns a member in conjunction with Airdrie, Hamilton, Lanark, and Linlithgow. The number of voters at Falkirk was, in 1835-6, 313; in 1839-40, 387; showing an increase of 74. For the whole district of burghs, the number was, in 1835-6, 1083; in 1839-40, 1369; showing an increase of 286. The two districts are proclaimed at Stirling and Falkirk respectively.

**Education and Crime.**

By the Returns made in 1834, and presented to Parliament in 1837 (Parl. Papers for that year, vol. xlviii.), the number of poor rate paupers was three, with 29 teachers, and a number of scholars varying from 1331 to 1587, nearly two-thirds of whom were boys: the number of other schools was one hundred and twenty-

one, with 138 teachers, and a number of scholars varying from 3435 to 5211. About three-fourths of the children were making a total of one hundred and fifty-four schools, with 177 teachers, and from 4883 to 6999 scholars. By making an allowance for defective returns, the estimated number of scholars is supposed to be 6670 to 8829. The number of children between the ages of five and sixteen who have learned or are now learning to write, as specified in the returns, is 2467, but the estimated number, making due allowance for defective returns, is supposed to be 4969: the number who have learned or are learning to read, is the returns 4223; but after allowing for defective returns, is supposed to be 8495, which is probably not half the whole number of children in the shire. The above returns relate to day-schools alone, not to Sunday schools.

The state of criminals in the manse-mented parish of Kilsyth is declared by the inspector of prisons to be unsatis-

factory. (Second Report, Parl. Pap. for 1837, vol. xxiii.) 'Many parents altogether neglect the instruction of their children . . . . It is estimated that about two-thirds of the children in the population of the district are not read easily, nor can they read even when much given to reading.' There is a great deal of drunkenness, and many offences are committed, chiefly as-

saults and petty thefts, which escape detection and punish-

ment, the police being inefficient. Crime had indeed in-

increased, but not in a greater proportion than population, and the offences were of a less heinous character. (Report, as above.)

There appear to be many offences of rather a petty kind in this county, though not many that are very serious. The most common are assaults and thefts. Falkirk, Alva, and Lennoxtown of Campsie, with their respective neighbour-

hoods, are the places in which offences are most frequent. The offences at Falkirk are chiefly assaults and petty thefts; but the most notorious place for decreasing: they occur chiefly at Carron (the most notorious place for offences in the east side of the shire), and are usually occasioned by drunkenness. Grangemouth, on the other hand, is one of the most quiet and unpopulous places in the district. The old highland parish of Buchanan, the parishes of Drymen and Killearn in the western part of the shire, Baldermarch in the north, andBothkennan and Slammanan in the east, are stated to be particularly free from crime and disorder. Crime at Stirling is described as being very light, where there is, for the size of the place, a considerable disorderly popula-

tion, consisting of prostitutes, thieves, and other loose cha-

racters; and there are always a number of vagrants in town, by whom half the crimes and disturbances in the coa

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History, Antiquities, &c.—Stirlingshire was, at the most, a
historic period, included in the territory of the
Dunmonii (Damnonii), a nation mentioned by Ptolemy and
by Richard of Cirencester, who calls them Damnii. They
were subdued by Agricola, a.d. 80, who formed a line
of forts through their territory, and which passed across the island from
Forth, through the Forth, or Frith of Forth, to the Giotta or
Clyde: this line of forts, the Roman general Lellis
Urbicus, in the reign of Antoninus Pius, about a.d. 140, con-
ected by a continuous rampart of earth or turf. Whether
these forts, or any other, which with good
reason are supposed to have existed along the line of the ramp-
art, were built by Agricola, or whether the number was in-
creased by Urbicus and his successors, cannot now be de-
termined. The forts, like the connecting rampart, were
originally of earth, but appear to have been, at a subse-
quent period, faced with stone.

The rampart of Urbicus, or, as it is sometimes called from the
emperor in whose reign it was constructed, the rampart of
Antoninus (Antonia), commences on the shore
of the Firth of Forth, a little to the east of Borrowstounness
in Linlithgowshire, and ran westward through Linlith-
gow, Stirling, Lanark, and Dumbarton shires, to the Clyde at
West or Old Kilpatrick. It consisted of a comparatively
shallow, a deep ditch, on the north side, and a military road accompanying it on the south side: the
remains of it are popularly known as Graham's, Grime's, or
Grime's Dyke, a name the origin of which is not ascertained.
It entered Stirlingshire in the parish of Polmont, thence, through Polmont and Falkirk parishes, into a detached part of Dumbartonshire.
In the parish of Polmont all traces of the work have disappeared, but in Falkirk there are some traces of it which can be clearly observed, as Calendarr park and Lauriestown, just to the east of Falkirk
town. The remains of one of the forts may be seen at Castle-Cary, six miles west of Falkirk, just where the ramp-
art leaves the shires. It is a square fort, with an area of
seven acres, and a half of part of the rampart of Urbicus for
the military way passed through it from east to west, and another military road entered it from the south. Several
antiquities have been dug up in the ruins of a house in the
south-east angle of this fort; and from the number of hu-
man bones found in the building, and from a great quantity of burnt wheat, it is supposed that the garrison must have
been slaughtered, and the place burnt by the natives. It
is supposed to have been the Cisca (Coria) of Ptolemy. Another
fort is supposed to have been near Falkirk, about three-quarters of a mile
to the northward of the rampart of Urbicus, to be
seen, some years since, the remains of a Roman station.
They were on a Roman road, which led from the rampart to the
Forth, which it crossed above Stirling, and thence to the
Roman posts in Perthshire. Roy describes the ascent
at Camelon as being, from its extent, and the many vestiges
or buildings remaining in it, one of the most considerable
which the Romans had in North Britain. It consisted of
two parts, the northern part appearing to have been the ori-
inal station, and the northern part a subsequent addition.
All traces of it have now disappeared. The Alana of Rich-
ard of Cirencester is supposed to have been at Kier, in Lecropt
parish, between the rivers Thaw and Allan, north of the
Forth, not far from Stirling; but there do not appear to have been any traces of works observed. The names Alana
and Allan probably embody the same element. The Roman
road just mentioned probably ran from Camelon by Alana
and Allan, through Linnan (Anstruther), and other parts, to
Falkirk. Some parts of this road may yet be observed near Camelon. It was formerly, and perhaps is still, called
Camelon causeway. It is a very carefully-made road, con-
isting of several layers of stones and earth, filling a trench
carved in the ground, and may be traced in places to form a raised causeway, with a small ditch or drain on
each side.

A singular building on the banks of the Carron, near
where the iron-works are now, supposed to have been a
sacellum or chapel, was demolished about a century since.
After the failure of the Scots' expedition into England in favour of Charles I., under the duke of Hamilton (A.D. 1649), the cause was left in the hands of those who had lost all arms, and a body of Highlanders of the insurgent party, under the command of the Duke of Argyll, was surprised at Stirling and cut to pieces or captured; the rest of the party, under the earls of Eglinton and Loudoun, were posted at Falkirk, and with them there was an accommodation entered into, which brought the matter to an amicable issue. The Scotch army retired to Stirling after their defeat by Cromwell at Dunbar, A.D. 1650; and again occupied the town and encamped at Torwood, about six miles south of it, previous to their ill-fated march to Edinburg (A.D. 1651). After that, the royal forces were defeated at the battle of Dunlithgow, and vainly attempted to draw the Royalists, who were commanded by Charles II. in person, to a battle. He stormed Callender House, close to Falkirk, in their sight; and having obliged the army to retreat, to Torwood to Stirling, captured many of their sick and a considerable quantity of military stores. Charles having marched into England and been followed by Cromwell, Monk, whom the latter had left behind him, occupied the town of Stirling, and in a few days forced the castle to surrender. The castle and the steple of the church, near which the besiegers had planted their batteries, bear still the marks of the damage sustained during this siege.

In the rebellion of 1715, the Royalists, under the duke of Argyll, marched to Stirling to encounter the rebels under the earl of Mar, at Sheriff Muir near Dunblane. [Pertshire.] The highland district of Stirlingshire was about this period the resort of the celebrated Rob Roy. In the rebellion of 1745, General Cope took possession previous to his march into the north of Scotland; but the Young Pretender eluded him, crossed the Forth below Stirling, and marched to Edinburgh. On the retreat of the rebels from England they besieged Stirling castle (12th of January, 1746), and General Hawley, at the head of a considerable force, having advanced to relieve it, was defeated by them (17th of January) at Falkirk. The Royalists numbered about 6000 men, the insurgents rather more. The forces of men was not great, but some pieces of cannon were taken, and the affair was discreetable both to General Hawley and his troops. The siege of Stirling castle was resumed after the engagement, but finally abandoned on the approach of the royal army under the duke of Cumberland; the rebels in their retreat blew up their powder magazine and abandoned their cannon and a number of their sick and wounded.

During the political excitement of the year 1820 some skirmishing took place at Bonny Muir, near Falkirk, between the Radical and military parties, to disperse the disturbances. The Radicals, who were armed, were chiefly from Glasgow.

The principal antiquities, besides Stirling Castle and Cambuskenneth Abbey, are the remains of some old castles and abbeys. There is an ancient fort of Castle Cary, on the line of Ubibus' rampart. Duntrush Castle, in Strathbogie parish, is a tolerable extensive ruin. The remains of Colzium Castle crown an eminence near Kilsyth; and the castle of Almond is a massive ruin, between Falkirk and Linlithgow. The ruins of Manby Priory are near the castle of Almond.

(St.15.)

(SI 1)

(STIVER. [MONEY.]

STIZOLOBIUM, a genus of plants which was so named by Persoon, from stizos, 'to prise,' and lobus, 'a pod,' from the pods of several species being compressed. In this genus, the species have been removed chiefly to Pachyrrhous [Dolicrichos] and to Mucuna; of the latter species Stizolum now forms a subgenus. The principle species of Mucuna have already been mentioned under the article Cowwir, or Cowwax, which is no doubt a corruption of the Hindustan name kitchew, which is the Mucuna pruriens of Hooker, indigenous in various parts of India, but usually confounded with Mucuna prurientis, a native of the West India Islands. The Indian M. pruriens is distinguished by its smaller leaves, its more hairy stem and leaves, and more truly rhomboidal, its flowers more commonly in threes, and by its legumes being much broader, compressed, and free from any raised line on the back of the valve, while in the American M. pruriens the pods are flattened, and keeled on the valves. The pods are astringent and bitter, and the seeds are astringent; the name is not a proper one; it is the name of a Mucuna, which is stated to be incised, and to have been named Stizolum. The plant is apt to be much injured by insects, and is very useful for the manufacture of cloth, and for that purpose the seeds are very much in demand. The plant is cultivated in the tropics, and also in the West Indies, where it is cultivated for that purpose. The seeds are used in Eastern medicine for the treatment of diseases of the liver.
Little known species is *Muscus utilis*, the *pois noire* of the *crabbes* of Mauritius and Bourbon, and thought to be a native of Arabia. It is universally employed in the above islands for enriching the soil for the cultivation of sugar.

The thick covering of leaves by which the male is covered, must be useful in preventing the soil from becoming parched, while the whole crop, being afterwards ploughed up, is found to be routinely useful in enriching the soil. The species has been introduced into India and is spreading over the country.

**STIJNSTOLPE, JONAS MAGNUS,** was born December 8, 1777, in the parish of Sienquist, in the province of Sodermanland, in Sweden, of respectable parents, but what the extent of their wealth was that they could afford to give him the most ordinary education. In all probability his talents would have remained in obscurity, had not his unusual abilities attracted the notice of Baron Flettwood and some of his friends, who put him to school at Stingnæs, where he soon distinguished himself, and when he was afterwards sent to finish his studies at Upsala. He seems however to have been very scantily provided for, since in order to eke out his means of support he was obliged to give himself to the performance of various odd tasks for book-sellers. At length an event occurred in 1802 which he himself has described as a most propitious revolution of fortune, namely, his being taken into the family of M. Beskow, a merchant, as tutor to his two sons, one of whom (Bernhard) was to become his biographer, and has set forth some of Stijnsmonde's proemious pieces, with an interesting biography of their author. From this event however no permanent advantage to his circumstances seems to have resulted, for notwithstanding his attachment to his studies, he has pursued his profession in any of his learned professions, and to accept a small appointment in a public office (the Krigs-Expedition), devoting only his leisure time to literary occupations. These consisted at first of translations of Milton's *Singsfried* and other German romances, to the extent of about 30 volumes. It was then that Beskow, wishing to assist him, offered him a situation in his own counting-house, with a salary more than double of what he then had; but he rejected the well-meant overture, that he might have more drinking money and writing verses to drinking wine and casting up accounts. Though he himself might not consider the labour of translating drudgery, that kind of it in which he first engaged was certainly unworthy of his talents. Therefore although it is to be regretted that he did not undertake more of original works of similar extent, it was not without advantage to the literature of his own country that he afterwards transplanted into it some of the productions of such writers as Cervantes, Voltaire, and Voltaire. Besides *Don Quixote*, *Parzival*, *Romances of the King of the Valley* and *Singsfried*, of this class include those of Pope's *Rape of the Lock*, and Blumauer's *Anees* (which latter poem he completed by adding the three last books, and which is considered to be in many passages superior to the original, not to mention a number of minor pieces, both from ancient and modern poets. Among his original productions, which are comparatively few, the principal are *Lunkentus*, a dramatic popular tradition; the *Argonauts*; and his comic tales in verse.

Notwithstanding his decided taste for works of fancy and humour, satire and wit, his reading extended to others of a very different class, to mathematics and the physical sciences, geology and astronomy, to which last study he was greatly indebted according to his biographer. Beskow had a very remarkable sort of contrast displayed itself in his conversation; for he would pass alternately from the gayest and liveliest topics to the most serious, from the most playful to the most profound. His conversational powers were, in fact, of the highest order: it was there that the originality of his mind fully displayed itself, for he possessed such extraordinary *improvisatore* talents, that he would delight his auditors almost an entire evening by a continual flow of wit and wisdom, which carried both him and his hearers. Those captivating qualities and the amiability of his personal character, his frankness and his disinterestedness, caused his society to be greatly sought after by those who were interested in literature and art; whereas it was said of him that he was not only known to his Swedish, but intimate with one half of the country. He constantly refused however to become a member of any literary society for which institutions he entertained no great respect. His epistolary correspondence was very extensive, and was marked by the same qualities as his conversation, though hitherto but a few specimens of it have been published by his biographer. He had commenced a translation of Ariosto, but did not live to make any great progress in it, being carried off by a paralytic attack on the 12th of September, 1831. (Beskow, *Minneserkingen*.)

**STOTA. [WSKELLS]**

**STOE, JOANNES,** a native of Stobi in Macedonia, whence he derives his name Stobesus, lived either at the end of the fifth or in the sixth century of our Lord. Respecting his life no particulars are known. We possess through him a number of extracts from ancient Greek writers, and partial copies of MSS. of his own works, reading from more than five hundred authors, both in prose and in verse, and put them together, and arranged them according to subjects for the use and instruction of his own Septimius. We are thus indebted to Stobesus not only for an immense number of useful and entertaining passages of ancient writers, but some authors would be altogether unknown to us if Stobesus had not preserved their names, together with some of their sentiments. The words of Greek poets in the first or second person are quoted in his works, but in regard to the writers he followed two different methods; sometimes he quotes the author's own words, and gives us their extracts, and sometimes he gives a mere summary or epitome of what his author contained. He himself called this *anthyphairesis* or *apodeixis*, and divided it into four books. But the work has come down to us in a somewhat different form. In our MSS. it is divided into three books, which form two separate parts. The first and second books are usually called *Stobesus' Lessons* (from their title, and not by his name) and *Thucydius*, and divided it into four books. But the work has come down to us in a somewhat different form. In our MSS. it is divided into three books, which form two separate parts. The first and second books are usually called *Stobesus' Lessons* (from their title, and not by his name) and *Thucydius*, and the third book at present consists of 127 or 128 chapters, which is the time of Photius the two last books together only contained 100 chapters. This difference in number however may be accounted for by supposing that some of the larger chapters were divided into smaller ones.

The edict princes of the *Eclogae* is that by W. Caster, Antwerp, 1575, fol, with a Latin translation. It was reprinted, together with the *Sermones* (the first edition of which was edited by Trincavelli, at Venice, 1536, in 4to, at Geneva, 1609, in 8vo), and *Sermones* (the second edition of the *Sermones* under the title *Joannes Sententiarum*), T. Gaisford, Oxford, 1822, 4 vols. 8vo., reprinted at Leipzig, 1823 and 1824, in 4 vols. 8vo. A complete edition of both works of Stobesus has been published by W. Caster, at Leiden, 1588, in 3 vols. 16mo. (Schöll, *Geschichte der Griech. Literatur*, etc. p. 183.)

**STOCK.** The English name for the genus of plants named by Brown *Matthiola*. *MATHIOLE.* Many of the species of this genus are great favourites in gardens, on account of their handsome flowers and fragrant smell. In order to raise the more valued kinds, as the double-stock gilliflower the Brompton and queen's stocks, the seed should be saved from plants growing among double flowers, as it has been proved that such seed produce more plants with double flowers than that which was made to flower by the single flowers. The seed should be sown in May, and when the young plants have attained a height of two or three inches, they should be thinned out till they are about nine inches apart. The plants that are taken out may be planted in the flower-border, and there kept in the same place. If the following winter should be severe, they should be covered over with mats. In the following spring they will produce their flowers. The annual or ten-week stock (*Matthiola incana*) is best. The planting is done in September, and the setting out is done in March. The seeds are sown in the last month will blossom till Christmas. All the annual sorts may be treated in this way. The double varieties of the shrubby kind may be propagated by cuttings, under glass, and planted in a sheltered place. A soil that is light and mixed with sand is the best adapted for them. The stock will not bear transplanting at a late period of its growth, as its fusiform root is not.
STOCKBRIDGE. [Hamphire.]

STOCKHOLM, the capital of Sweden, is situated in 59° 39' N. lat. and 18° 31' E. long., on the channel by which the Baltic is connected to the ocean. Following the numerous windings of this channel, the open sea is reached at a distance of 35 miles from the town, but on a straight line the distance does not exceed 24 miles. The channel varies in width between less than a mile and five miles. The acclivity is exceedingly steep.

The city of Stockholm is built partly on the continent and partly on nine islands formed by the above-mentioned channel: the islands are called holmen. In the middle of the city, at the entrance of the Baltic, is the island of Staden, which is situated between the islands of Riddar holmen and Soder holmen. The island of Queen's Holmen, which is also included in the city, is connected with the islands of Riddar Holmen and Soder Holmen by a narrow channel, which is divided into two branches. The island of Stockholm, on the north-east of the city, is north-east of Stockholmen and south-east of Norr Malin, of which it now constitutes a portion. It contains some fine buildings. Conjoined to it, and only separated by a narrow channel, over which there is a bridge, is a small island of Kyrkholm, from which a long wooden bridge leads to Skeppsholmen, where the borough of the city is situated. Another wooden bridge leads to Kastelholmen, a very elevated island, planted with fine trees: a castle is built here for the residence of the king.

There is probably no capital in Europe, except perhaps Constantinople, which can be compared with Stockholm as to the beauty of its environs. The numerous channels between the islands and in some places contracted to the narrowness of a river, and with the direction of the other channels, without the dimensions of a lake, enclosed by a rocky bank, changing continually in elevation and form, and overgrown with beech, birch, and pines, and at several places cut by narrow streams and broken crooked by swamps, form an extensive promenade, and present an infinite variety. Country-houses are dispersed over the hills surrounding the town; but the place which is most resorted to for pleasure is the zoological garden, which lies eastward of the city, and is separated from it by the island of Slussen, which is connected with the mainland by a narrow channel.

It is a peninsula two miles long and about one mile wide, and its surface is diversified by groves of birch, beech, and pines, by steep rocks and numerous depressions, frequently covered with a fine turf. Within the zoological garden is a garden, the Royal country-seat called Rosendal, which is surrounded by a large park. Other royal country-houses are north of Norr Malin, at Ulrikadal, Haga, and Karlberg: the last is now a military academy. But the most distinguished of the royal country-houses lie to the west of the town, on islands in the lake of Malma; they are Gripsholm, Drottningholm, and Swartself. Drottningholm is an edifice distinguished by great beauty, and contains a fine collection of pictures and coins. Swartself is surrounded by a large park.

Stockholm is the seat of the government, and generally also the place where the legislative body meet. It contains consequently the offices of all the branches of administration and the superior courts of justice. There are several scientific and literary societies, among which the Royal Society of Sciences has greatly contributed to the advancement of natural philosophy, chemistry, and natural history. There is also a Royal Academy of literature, history, and art, and the Swedish Academy, an object which is to promote the cultivation of the native language, an academy of military sciences, an academy of liberal arts, a musical academy, and an academy of agriculture. The charitable institutions are very numerous, and in this respect Stockholm is the largest city in Europe, and enjoys the advantages of royal patronage.

Besides a well-constituted grammar-school, there are some schools for the middling classes, and 14 elementary schools, mostly conducted on the plan of Bell and Lances. The free education of the young has been neglected, and who wish to improve their knowledge.

The population of Stockholm consisted, according to the census of 1825, in 82,000; but in 1839, according to Toll's account, of 81,000; and in 1839, 88,885 persons, according to the same authority. The number of families in 1825 was 14,436, of which 1314 were rather wealthy, 8771 in comfortable circumstances, and 6484 poor. The number of nurses employed by government and families, the military included, did not exceed 6487; and
the remainder consisted of merchants, traders, mechanics, and seamen, with their families, and the persons attached to their business.

Stockholm is the most industrious and commercial town of Sweden. There are manufactories of cloth, cotton, calico, silk, ribbands, sanger, tobacco, leather, cast-iron, and soap. But no branch of manufacturing industry is carried to such an extent, either in Stockholm or in any other place in Sweden, as to supply the demand, and large quantities of foreign manufactures, and especially English, are annually imported.

The commerce of Stockholm is more important. Nearly the whole of the superfluous produce of the country now passes through this port, and is exported to foreign countries. It is mostly shipped in Swedish vessels, of which in 1827 Stockholm possessed 146, with nearly 27,900 tons burden, and crew amounting to 1685 persons. The most important article of export is iron; according to an average of ten years (1821-1830), it amounted annually to 31,993 tons. The second article is timber, boards, &c.; and the third is tar and pitch. Minor articles are copper, cobalt, ready-built vessels, linseed-oil and oil-cakes, tobacco, steel, bricks, and a few other articles. The most active commerce is carried on with England, the United States of North America, Denmark, France, Prussia, Portugal, the Netherlands, and Italy. The most important articles of import are sugar, coal, hemp, cotton, wool, manufactures gold, silver, cotton, silk, linens, china and crockery, hemp, cotton, cheese, potash, hides and skins, tallow and candles, train-oil, dyeing-woods, ramies, almands, pepper, cinnamon and cassia, tea, butter, and wool.

The clergy.-(From Schwenck; Forsell's Anteckningar över Sverige, Stockh., 1839; and Schubert's Reise durch Schweden, Norwegen, Lapland, &c.)

STOCKING WEAVING. [Warning.]

STOCKPORT, an important manufacturing town and parliamentary borough on the river Mersey, partly in the parish of Manchester, in the hundred of Saltford, in the county of Lancaster, but chiefly in the hundred of Macclesfield, in the county of Chester, 180 miles north-west of London. Post Office, 1879; communication by the canal, (formerly mail) road, through Barnet, St. Albans, Northampton, Leicester, Derby, Ashbourn, Leek, and Macclesfield, and about seven miles south-east from Manchester.

Stockport, antiently called Stockportes and Stockport, was made a free borough by Robert de Stokportes, with the permission of Edward I. as earl of Chester: the same Robert had the grant of a market and an annual fair. There was an antient castle at Stockport, of which not a vestige now remains. The town was garrisoned by the Parliament in the great war of the Incarnation and was taken again by the Roundheads, a.d. 1644, by the Royalists, under Prince Rupert, who had previously repulsed the garrison, 3000 in number, when they marched out to attack him: the Parliamentarians subsequently recovered the place. Stockport-bridge has been blown down and is prevented from repair after their advance to Derby; and they were in consequence obliged to wade through the river.

The parish of Stockport, which is wholly in Cheshire, comprehends an area of 24,816 acres, with a population of 66,610: it is divided into fourteen chapels or townships, of which the township of Stockport (which coincided with the antient borough) had an area of 1740 acres, with a population of 24,469; but the town having extended beyond the limits of the antient town the Parliamentary boundaries were, by the Boundary Act, made to comprehend; in addition, the most populous parts of the township of Heaton Norris (in Manchester parish), part of the township of Withington, St. Peter's, and their bounds from Brinklow and Edgeley, in the townships of Chadsley Bulkley and Chadley Moseley, in Chedle parish, the whole having a population of about 43,000. The town stands at the junction of the rivers Tame and Mersey, and has a number of streets, with a large open market-place in the centre. It is well paved under the provisions of the general Highways Act, and is lighted with gas under a local act. The principal part of the town is built on a steep and irregular hill of soft sandstone, and does not exceed in area 1000 acres from the south bank of the Mersey. The market-place and the parish church are on a tolerably extensive level on the summit of the hill; the streets leading to them are steep and narrow. There are four bridges in or near the town over the Mersey, and one over the Tame. The 'old bridge' over the Mersey, near the market-place, is of one arch, built high above the river to avoid the irregularities of the stream, and having its abutments built on the solid rock, which here lines the banks of the river. Below the 'old bridge' is another bridge, of eleven arches, crossing not only the river, but its valley, and lined with a number of houses, with the exception of 40 ft. of one arch over the river is of 90 feet span; most of the dry arches are on the Cheshire side. This bridge was built that the Manchester and Buxton turnpike-road might avoid the ascent and descent caused by the uneven site of the town.

There are two large foundries in Stockport, one of which has been re-built in the present century, in the perpendicular style of architecture. It has a tower with pinnacles and pierced battlements, a nave with side aisles, and a chancel. The chancel is the sole remaining part of the former building, but it has been much altered; and a fine east window of decorated English character, but much decayed, the old church having been built of soft red-sand-stone; there were also some fine stone stalls in the south aisle of the chancel. There are three other places of worship, with number of the establishment in the borough. It is a handsome building of Grecian architecture, with a tower surmounted by a cupola; St. Peter's chapel, a neat brick building, erected about the cause of the Highlands, and containing the present erection in Heaton Norris. Besides these, there are a number of dissenting meeting-houses of different persuasions. There were, in 1834, three for Independents, three for Methodists, and one each for Baptists, Unitarians, Burman Calvinists, and the Church of Rome. There are two school-rooms, built by subscription at a cost of about 6600l.; a grammar-school, lately rebuilt by the Goldsmiths' Company of London; a very large national school, an infant school, which is a very ornamental building, and a small theatre.

Stockport was the scene of the principal act of the Reform Act. Pigott's Directory for 1834 enumerates nearly one hundred and twenty firms in Stockport and Heaton Norris engaged in different branches of this manufacture; and it adds that the manufacture of calicoes, &c. has been established in Stockport, the Manchester and Birmingham Railway, which has been opened between Manchester and Stockport. The market is on Friday, and is the most important in Cheshire for corn, hay, malt, coal, and cheese. There are about thirty retail stores, chiefly for cattle.

Stockport was formerly incorporated, but the corporation, previously to the late Municipal Reform Act, had gone to decay; a mayor was chosen at the court leet and baron by the manor; but his office was merely nominal, the jurisdiction of the town being in the hands of the county-magistrates. By the Reform Act Stockport was made a parliamentary borough to return two members; the boundaries of the borough have been already described. The present members are Mr. Stockport, for the town, and Mr. Charles, for the Stockport Hundred. By the Municipal Reform Act the parliamentary boundaries were adopted for municipal purposes, the borough was divided into seven wards, a number which the revising barrister reduced to six; the town council consists of fourteen aldermen and eighty-four四十-two councillors, and the town has a commission of peace.

Stockport has an auxiliary Bible society, a news-room, and a subscription library. Two newspapers, 'The Stockport Gazette,' and 'The Stockport Chronicle,' are published in the town.

The living of Stockport is a rectory, in the rural deanery of Macclesfield, and in the archdeaconry and diocese of Chester, of the clear yearly value of 1882l., with a glebe-house. The town has a large post-office; there are curries of the clear yearly value of 110l. and 290l. respectively; Heaton Norris is a chapelry, in the parish and rural deanery of Manchester and in the same archdeaconry and diocese as
Stockport; its clear yearly value is 1167. The townships of Stockport, Brinnington, Heaton Norris, Cheadle Bulkeley, and Cheadle Moseley, are wholly or partially in the borough, had the following number of schools in 1833:—

<table>
<thead>
<tr>
<th>Day Schools</th>
<th>Sunday Schools</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stockport</td>
<td>50</td>
<td>1962</td>
</tr>
<tr>
<td>Brinnington</td>
<td>2</td>
<td>114</td>
</tr>
<tr>
<td>Heaton Norris</td>
<td>9</td>
<td>481</td>
</tr>
<tr>
<td>Cheadle Bulkeley</td>
<td>8</td>
<td>323</td>
</tr>
<tr>
<td>Cheadle Moseley</td>
<td>4</td>
<td>163</td>
</tr>
</tbody>
</table>

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One of the day-schools at Stockport is an endowed grammar-school, under the patronage of the Goldsmiths' Company of London. It had, in 1833, 150 boys; another was a national school, with 225 boys and 170 girls. One of the first schools, the Stockport Sunday-school, was not exclusively connected with any denomination. The Bible was used as the school book, and the children were taken alternatively to church and to dissenting places of worship. This school, with four branches, had, in 1824, 524 scholars, about half of each sex. It was supported by subscription, and was under the management of a committee elected from among the subscribers of a guinea and upwards, and of visitors chosen from among the persons actively engaged in the work of the school. It was held in the library of a large number of 600 volumes, and a scholars' library of 1700. There were connected with the school a religious tract society which circulated yearly 30,000 tracts, and a Bible association which distributed yearly about 400 copies of the Scriptures. Thus was founded in connection with the institution, and which continuance and multiplication of an individual plant that may possess peculiarities deemed worthy of preservation. It is by this process that the great number of varieties of cultivated fruits are preserved with remarkable integrity, and by which constant improvement may be secured.

In the process of grafting much depends on the stocks which are employed, and it is by ascertaining the best modes of growing stocks, and the relation that exists between the various kinds of stocks and the grafts and buds that are pissed upon them, that we are to look for the improvement of the various kinds of garden fruit.

Stocks are for practical purposes divided into three kinds. Crab stocks, free stocks, and dwarf stocks. Crab stocks are those which have been grafted from wild and ungrafted trees, as the cherry, plum, apple, &c. These stocks are commonly used where a large and hardy growth is desirable. In the selection of wild stocks, those which grow cleanest, and are free from irregularities of the stem and defects in the fruit, should be preferred. In the growing of stocks, which are raised from the seeds or layers of fruit and orchard trees which have been grafted, these stocks are found desirable when the object of grafting is to obtain choice varieties of apples, pears, nectarines, apricots, or plums. Dwarf stocks are those which are raised from low-growing shrublike trees. They are used in the grafting of low-standards for small gardens, also for wall-trees, and espaliers.

Stocks are raised in nurseries from seeds, suckers, layers, and stocks. From seeds, they may be obtained in the autumn, in beds of common light earth; all lateral branches should be cut off as they grow up; and, according to circumstances, they will be fit for grafting in one, two, or three years. Stocks may be used when they have attained the size of a grown tree in grafting, to the time of the small finger. When stocks are wanted expeditiously, they may be produced from suckers taken up and planted in the autumn, when they will be ready for use the following July or August. They are not often raised from layers and cuttings.

In the selection of stocks, not only is it care required that they be of the same kind as the grafted or stock, but that there be a proper relation between the rapidity of their growth ascending to the objects wished to be attained. When the stocks are raised to be grafted in the following year, the stock; it will sometimes die. This is the case with peach-trees budded on plum-stocks and pears on the hawthorn. At the same time, when trees are naturally too luxuriant in leaves and branches, they may be dwarfed in their growth and made fruitful by placing a scion from them on a stock that grows slower than themselves. In this way apples may be dwarfed by being grown on paradise, pear, or quince stocks. Of this fact Knight gives the following explanation:—The disposition in young trees to produce and nourish blossoms, buds, and fruits, is increased by this apparent obstruction of the descending sap; and the fruit of such young trees, which has been thickened up by the dwarf scion, has upon its own stem or a stock of its own species, would descend to nourish and promote the extension of the roots. The practice therefore of grafting the pear-tree on the quince-stock, and the peach and apricot on the plum, when extensive growth and dormancy are required, and it is beneficial wherever it is wished to diminish the vigour and growth of the tree, and where its dormancy is not thought important. (Hort. Trans., it.)

It is frequently desired to select those stocks which are harder than the soil, for the purpose of ensuring the growth of the latter. Not that the stock has any power of communicating hardiness to the scion; but those stocks which are accustomed to colder latitudes will supply a sufficient quantity of vigour, by which it will be able to resist the influence of a decrease of bottom heat.

M. Dubreuil117 of Rouen has lately pointed out the fact that the kind of soil in which a stock grows has something to do with its being adapted for the growth of certain plants. The soil in which the stock is planted, serves as a kind of nucleus; and, although the stock be grafted on a dwarf scion, either the plum or the wild cherry would do as stocks for stone-fruit, nor the prunus or quince stock for pears and apples. The crab was found best for the apple, the wild pear for the cultivated plum, the almond for the plum, and the mahaleb for the cherry.

The following table, from Dr. Lindley's 'Theory of Horticulture,' p. 24, gives a comparative view of the stocks which were found best suited for the scions of the apple, pear, plum, and cherry, in three different soils:—

<table>
<thead>
<tr>
<th>Scions</th>
<th>Scion soil</th>
<th>Chalk soil</th>
<th>Light soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pear</td>
<td>Quinse.</td>
<td>Wild pear.</td>
<td>Quinse.</td>
</tr>
<tr>
<td>Cherry</td>
<td>Wild cherry</td>
<td>Mahaleb.</td>
<td>Wild cherry</td>
</tr>
</tbody>
</table>

It has long been known that many scions did better on another species of stock than on their own, but it was not known that soil could have any influence on this; and this was increased a further interesting inquiry for the vegetable physiologist and horticulturist.

STOCKS, a term applied to the various 'Funds' which constitute the national debt. The number of distinct accounts of stock on which dividends were paid in 1839 was as follows:—

<table>
<thead>
<tr>
<th>Accounts not exceding</th>
<th>Dividends not exceding</th>
</tr>
</thead>
<tbody>
<tr>
<td>£ 5</td>
<td>83,069</td>
</tr>
<tr>
<td>10</td>
<td>43,147</td>
</tr>
<tr>
<td>50</td>
<td>98,246</td>
</tr>
<tr>
<td>100</td>
<td>26,295</td>
</tr>
<tr>
<td>200</td>
<td>59,186</td>
</tr>
<tr>
<td>300</td>
<td>4,495</td>
</tr>
</tbody>
</table>

Each proprietor of stock may transfer his interests to others by sale. When the transfer is effected by a broker he must be authorized to act in the name of the principal, the stamp-duty on which is £1 6s. d.; and the devoue.? may be so drawn as to empower him both to buy and sell stock and to receive the dividends for the person by whom he is commissioned. A person may sell stock except through the medium of a broker, but the general practice is to receive their dividends themselves. The purchaser acquires the dividend due upon the stock for the current half-year, and thus at one point there will be a sum of 29s. 4d. due on three-per-cent stock, and a fort-night afterwards only 1s. 6d. On the bargain being completed, the parties repair to the Bank or South Sea House (according to the stock), where the actual transfer effects registration. For this purpose the seller presents a note in this form:—

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clerk, and then fills up a receipt, a printed form of which, with blanks, is obtained at the office. The clerk, in the mean time, examines the seller's accounts; and if he find him in circulation, he signs the receipt, and, having paid over the transfer. This is signed in the books by the seller, who delivers the receipt to the clerk; and upon the purchaser's signing his acceptance in the book, the clerk signs the receipt as witness. It is then delivered to the purchaser upon the payment of the price, and the books are then closed, and the business is completed.' (Dr. Hamilton, History of the National Debt.)

Bargains in stock are transacted in the Stock Exchange, in Capel-court, Bartholomew-lane. Brokers and jobbers who are not members assemble in the open court in front of the Exchange, and many of the members of the Stock Exchange, into which association they are elected annually by ballot; but many of the jobbers are said to be persons of wealth. The governing body consists of a committee of twenty-four, all elected by ballot. The established rate of brokerage is one-eighth per cent. (or 2d. in the 100.) upon the amount of stock transferred. There is no stamp-duty or tax of any kind upon transfers of Government Stock; but the transfer of Bank Stock under 2d. costs 9d., above that amount, 12d.; of South Sea under 100l. 16s., above it, 12s.; and of India Stock, of any amount, 12s.

The dividends on all descriptions of stock are due half-yearly, either on the 4th of January and 4th of July, or on the 4th of October and the 4th of April, and the days of October are designated week afterwards; and for about six weeks previously, the books at the Transfer Office being closed, transfers cannot be regularly made. The transfers on each stock are effected at a certain day in each week, which day may be ascertained by reference to any Almanac.

The bargains for time form a very important portion of the business of the Stock Exchange. They are bargains to deliver stock on a certain day at a certain price, the seller of course believing that the market price will fall, and the buyer that it will rise. When the period for completing the bargain has arrived, a settlement is usually effected without any payment of stock, the losing party simply paying the difference of price, which is usually made for certain days fixed by a committee of the Stock Exchange. The period it was settled within varies; but on an average, it is settled within about eight to ten weeks. (Dr. Hamilton.) Time bargains cannot be enforced in a court of law, and the parties are held to them only by a sense of honour and self-interest, and the fear of exclusion from the Stock Exchange, which denies their credit. A defaultor, in the language of the Stock Exchange, is termed a 'lame duck,' and his name is posted for a certain time in the great room. The sellers of time bargains are also technically called 'beers,' and the buyers 'bulls;' the interest of the latter is in being to beat down prices, and of the latter to raise them.

Stock of a high denomination may usually be bought cheaper than that of which the nominal interest is lower; and it is therefore the most advantageous for temporary investment. There is always a probability that the stock bearing the highest rate of interest will be reduced by the government when a favourable occasion presents itself; but the price of any one stock may be taken nearly as an index of the form of the market. For example, when 100l. is in 10 per cent. stock, costs 90l. the par would be 105l. in a three and a half per cent. stock. When the Government reduces the interest on a particular stock, it is generally followed by a reduction of the rate of interest on the other stocks, and this period having expired in regard to the New Three and a half per Cent. Stock, its relative value, compared with the Three per Cent. Stock, is as 90 to 99, there being always a probability that the interest on the former may be reduced. The fluctuation in the price of stocks generally may be traced to an almost infinite variety of causes—to the abundance or scarcity of money, and the opportunities of employing it to advantage in mercantile transactions, the rise or fall of a new war, or of the improvement of a fresh tax, or even the repeal of a tax; to rumours of war; and to innumerable other circumstances relating to the trade, finance, and other domestic affairs of the country. In 1759 the Three per Cent. were reduced to the lowest price at which they have ever sold, and the effect of the success of the French armies, combined with adverse circumstances at home.

The following is a brief notice of each description of stock present existing, which are bought and sold on the Stock Exchange, with the amount of each on the 5th of January, 1841—

1. South Sea Stock, divided into the Company's Stock, or trading capital, amounting to 3,662,748l.; Old South Sea Annuities, 3,667,387l.; New South Sea Annuities 2,460,830l.; and South Sea Annuities of 1751, 593,100l., all of which have been created out of the capital of the famous South Sea Company by successive Parliamentary arrangements. The interest paid by the State upon the whole amount of this stock is now 3 per cent., although the dividend received by the proprietors of the 3,662,748l. of Company's trading stock is 3½ per cent. The additional half per cent. is obtained from certain fines and from the allowances made by Government for the management of the port. The stock has been paid in South Sea Stock, and stock, of annual payments for 4½ per cent. interest, and the interest has been afterwards reduced to 3 per cent.

2. Debts due to the Bank of England, amounting to 14,686,609l., advanced at different times by the Bank to the public; the Bank receives interest on the amount at the rate of 3 per cent.

3. Bank Annuities, created in 1762, amounting to 825,251l. This stock was originally 1,000,000l., which was raised in 1762, by lottery, to pay off arrears that had accumulated on the Civil List, and for which Exchequer bills had been previously issued, and is now 3½ per cent.

4. Consolidated Annuities, commonly called Three per cent. Consols. The amount of this stock, in January, 1841, was 362,542,377l. It was originally formed by the union of several funds which had before been kept separate, in the year 1724, by an act which was passed in 1723.

5. Three per Cent. Reduced Annuities, amounting to 125,861,050l. This stock consists of various sums originally borrowed at a higher rate of interest, but on which the interest has been afterwards reduced to different rates.

6. Annuities at 3½ per Cent., 1818, amounting to 10,159,721l. Formed in 1818, partly by the funding of Exchequer bills, and partly by the conversion of certain 3 per cent. consolidated and 3 per cent. reduced annuities.

7. Reduced Annuities at 3 per Cent. consolidated stock, amounting to 60,259,849l. Formed in 1824, by the conversion of a former stock called the Old Four per Cents.

8. New 3½ per Cent. Annuities, amounting to 143,223,865l. Formed in 1830 out of the former stock called the New Four per Cents.

9. New 5 per Cent. Annuities, amounting to 426,076l. Formed in 1830, by the same arrangement out of which the New 3½ per Cent. Annuities then arose.

The total amount of the Irish Stocks, on the 5th of January, 1841, was 33,909,266l.

Besides these several stocks, there are—

1. The Long Annuities, consisting of an annual charge of 1,294,140l. These have been granted at different times, chiefly to the proprietors of the canal, and to the subscribers to lots, and all expire on the 5th of January, 1860.

2. The Annuities per 4 Geo. IV., ch. 22, commonly called The Dead Weight Annuity. This is an annuity of 566,700l. paid every year by the public to the Bank of England, in order to pay the interest of a new annual consideration of advances to the amount of 13,089,419l. made by that establishment. (National Debt.)

3. Life Annuities per 4 Geo. III., ch. 12, 10 Geo. IV., ch. 24, 4th of April, IV., ch. 14, occasioning a charge of 857,856l. These are annuities upon the lives of individuals, which the Commissioners for the redemption of the National Debt were originally empowered to grant by an act of 1797, in exchange for so much stock in interminable annuities as was converted into the present value, according to a scale varying with the fluctuations in the prices of stocks. In 1829, however, Mr. Finsdell, the Government actuary, discovered that the tables which had been all along used in these calculations were erroneous.
when the Act upon which the annuities are now granted was passed.

4. **Annuities** for terms of years, under the above Acts, of which the present charge is £1,314,927/. These annuities are granted for various terms of ten years and upwards.

5. There are certain **Tees**, and other **Lands**, which are patented by various Acts, of those forming part of the **English** debt occasioned, in January, 1841, a charge of £9,686, and those forming part of the Irish debt, a charge of £9,190.

The two following descriptions of stock, in addition to the above, are constantly operated upon by the sale and purchase of shares at the Stock Exchange.

1. **Bank Stock**, being the trading capital of the Bank of England, was created to the proprietors, amounting formerly to 14,553,000/, but since the last renewal of the charter, in 1833, to only 10,914,250/. The interest is 8 per cent.

2. East India Stock, or the capital belonging to the East India Company, amounting to 6,000,000/. Ever since 1793 the interest upon this stock has been 10 per cent.

Besides these English funds, shares in many descriptions of foreign stocks, which have been created by loans raised in these countries, are constantly for sale in the money-

**STOCKS**, a wooden machine formerly much used for the punishment of disorderly persons by securing their legs. The mode in which they were first used in England is not absolutely clear. London, 1525 Edw. IV. A.D. 1530, in the octavo of the Purification, it is enacted that refractory artisans shall be put in the stocks by the lords, stewards, bailiffs, or constables of the towns where their offences or transgressions have been committed, and that in small towns and villages the next good, there to justify themselves; and that stocks be made in every town for such occasion between that time and the feast of Pentecostet. (Rot. Parl., ii. 234.) In 1376 the commons prayed the king for their establishment in every village. (Rot. Parl.)

In 'King Lear,' act ii., sc. 2, Shaksp. has introduced the stocks upon the stage. Farmer, commenting upon the passage (see Malloie's Shaksp. edit. 1821, vol. x., p. 99), says, 'It should be remembered that formerly in great houses, and part of the towns, stocks were kept for the correction of the servants.' The last pair of stocks seen in London remained till within these very few years in Portugal-street, Lincoln's Inn-Fields. A whipping-post weekly adjourned the stocks.

**STOCKTON-UPON-TEES**, a town in the south-west division of stockton district, in the county of Durham, 340 miles from the General Post-office, London, by railway through Birmingham, Warrington, Manchester, Nantwich, York, and Darlington, 40 miles from the isle of Dominick (which is in Barnet, Biggleswade, Norman Cross, Stamford, Grantham, Newark, East Retford, Doncaster, Abberford, Boroughbridge, Thirsk, and Yarm. The town is well paved, and lighted with gas, under a local act. The houses are for the most part brick; the few that are built of stone are from the materials of the castle. The church is on the east side of the High Street, and at the eastern end of the church is a green, now jibbed and formed into a square. Altogether Stockton is one of the handsomest and cleanest towns in the north of England. The church is spacious and convenient brick building, erected early in the last century, with a tower at the west end 80 feet high. There are places of worship for Independents, Baptists, Unitarians, Quakers, Wesleyans and Primitive Methodists, and Roman Catholics. The town hall, in the middle of the High Street, is a quadrangular building, surmounted by a clock and spire. There are a custom-house, a news-room, assembly-rooms, billiard-rooms, and a small theatre. There is a race-course on the south side of the Tees by steam-packets; and with Darlington, York, Manchester, Birmingham, and London by railway. The Stockton and Darlington Railway, which forms part of the first line of communication, has one terminus on the quay, in the very heart of the town, and another on the opposite side of the Tees, at Stockton, 240 feet long within the piers, and 30 feet above low-water mark. This railway was commenced under an act obtained in 1821, and was opened in 1825. Its whole length is 44 miles, of which 10 are formed on which locomotive engines were employed. A branch of the Clarence Railway (which extends from the Stockton and Darlington Railway, between Darlington and Bishop Auckland, to the mouth of the Tees, on the Durham side), with its termini on the last Wednesday of every month. There are four banking establishments at Stockton. There are extensive coal-works and some brick-yards near the town, and a salmon and other fishery in the Tees.

Stockton has a savings-bank, a mechanics' institution, a dispensary, and almshouses.

Stockton is a borough by prescription; it has no charter, nor had the inhabitants ever had any jurisdiction. Petty sessions were held weekly by the county magistrates for Stockton ward. The borough comprehended only a small portion of the town; but a considerable extension of its limits has been recommended by the Municipal Corporations' Enquiry Act.

The borough was divided into two wards, and has 27 members in Parliament and eighteen councillors. The borough has now a commission of the peace. Stockton is a polling-station for the southern division of the county of Durham.

The living of Stockton is worth £436, and ancient prebendary and deanery of Durham, of the deanery, value 3474s., with a glebe-house.

The township had, in 1833, twenty-one day-schools, with 902 children of both sexes; and five Sunday-schools, with 183 children, and 70 girls, was supported by endowment; and a school, with Vol. XXIII._L
STOCKE, distinguished as STOKE-UPON-TRENT, one of the new parliamentary boroughs created by the Reform Act, in the northern division of Pennhill hundred, in the county of Stafford. Stoke, which gives name to the borough, and Burslem, one of the principal towns in it, are each 182 miles north-west from the General Post-office, London, by Barnet, St. Albans, Daventry, Coventry, Coleshill, Lichfield, Stone, and Newcastle-under-Lyne; or 162 miles by the Birmingham and Great Junction railways to Stafford, and from thence by Sandon and Northwich. There are almost 2,000 houses and a population of about 7,000, and the annual value of the assessed property is £7,000. The town is well connected with the London, Midland and Scottish Railway by a branch line opened in 1880, and serves as a market and manufacturing centre for the surrounding agricultural district. There are also two large cotton mills, a woollen mill, a paper mill, and a tobacco factory in the town. The population of Stoke was 7,091 in 1841, and 7,950 in 1851.

STOUFFER, John, a celebrated German astronomer, who was born December 16, 1492, at Justingen in Swabia. He was appointed professor of mathematics in the University of Tubingen (in Wirtemberg), where, besides pure mathematics, he taught astronomy and geography, and he appears to have been successful in gaining the esteem of his numerous pupils, and was engaged by Johan Melanchthon, and Sebastian Minster. In the year 1530 he made a journey to Vienna, in order to be present at the installation of a professor of mathematics in the University of that city; and, according to Melchior Adam, he died of a contagious malady as a result of the journey, in February 1531, in the following year, being 79 years of age. His funeral was celebrated with great magnificence, and his tomb was adorned with his effigy. According to the practice of astronomers in that age, Stöffler spent much of his time in the computation of ephemera, and he appears to have been the first brought to public notice by continuing the series which Müller (Regiomontanus) had commenced. He constructed an astrolabe, which was intended to be used as an instrument for making celestial observations, and on the planes of which were projected the circles of the sphere: an octagon, which was given by him in a tract which was published at Tubingen in 1513; and in the same tract there is given an account of an instrument for determining the hour of the day by an observation of the sun; which was added to the study of astrology; and in the ephemera for the year 1546 he announced that, in consequence of a conjunction of the superior planets in the month of February, there would happen a deluge which would be fatal to the human race. Many persons had fear of this event, which was supposed to have been brought about in order to save themselves; and it is remarkable that the fact of the prediction being found to be erroneous, neither disposed the author to renounce the study of astrology nor diminished the sale of his ephemera. He published these works successively for several years, and added to them predictions, and took measures to save themselves; and it is remarkable that the fact of the prediction being found to be erroneous, neither disposed the author to renounce the study of astrology nor diminished the sale of his ephemera. He published these works successively for several years, and added to them predictions, and took measures to save themselves; and it is remarkable that the fact of the prediction being found to be erroneous, neither disposed the author to renounce the study of astrology nor diminished the sale of his ephemera.

The Burslem and the above-mentioned tract on the use of the astrolabe, Stöffler published astronomical tables (Tubingen, 1500); a tract on the calendar (Oppenheim, 1518); and a commentary on the Sphere of Proclus (Tubingen, 1531).

STOICIA. [See Stoics.]

STOKE, the name of a large village and market-town in the county of Stafford, and of the borough of Stoke-upon-Trent, in the north of England. It is situated on the south side of the Trent, in one corner of which is the watch-house, in another corner is a two-storied prison or lock-up-house. The church, or rather chapel, at Hanley is a commodious brick building with a tower 100 feet high. A new church has been built in Shen- ton. There is a building for the poor, a handsome one for a British school. There are several places of worship for different classes of Dissenters; that for the Methodist New Connection has a large Sunday-school room attached to it, capable of containing 1000 children.

The population of Hanley and Shelton townships, in 1831, was 16,380; 144 men were returned as engaged in manufactures; they were nearly all engaged in the earthenware manufacture, in which they were assisted by their families. There is one banking establishment, and several money-lenders. The town is divided into 13 wards, of which the long street of about one hundred and twenty houses, with a Wesleyan Methodist chapel and a large British school, an extensive earthenware manufactuary (Wedgwood's) and a model village, is of considerable importance. Hanley was the great improver of the earthenware manufacture of the district [Earthenware, vol. i., p. 294] is in Shelton township, and its population is included above. These are well-supplied marka, on Wednesday and Saturday, the latter being the principal; the towns, which a few years since produced 700L. per annum, are appropriated to the improvement of the town.

Lane-End is at the south-south-east extremity of the district, about three miles from Stoke. It was formerly returned as a separate township, and has only 3 acres of land. The present occupants, who are all farmers, raise the more modern parts are regularly laid out, and built with tolerable uniformity. There are two places of worship in the establishment; one built, or rather rebuilt, in 1795, the other in 1834; several Dissenting or Methodist meeting-houses, and a Catholic national free-school, and a large national school. Lane-End has two market-places; one, with regular shambles and stalls, is used for the weekly market; the other, with a spacious market-hall, commonly used for public meetings, is appropriated to yearly fairs. There is one annual fair, to the improvement of the town. The population of the township of Lane-End, and of the township of Longton, into which the town extends, was, in 1831, 9005; of whom 981 men (besides their families or assistants) were employed in the manufacture of earthenware. The market of Hanley is an iron-work for smelting the ironstone found in the neighbourhood. There are two banking establishments. The market is on Saturday. There are several yearly markets. Stoke has a number of modern houses, regularly laid out. The streets have their footpaths paved with brick, and are lighted with gas. In the centre of the town is the extensive earthenware manufactuary of Meers, Spode and Co., and about two miles from the town is the town of Hanley, the largest town in the district, is about a mile farther.

This borough has this peculiarity, that instead of comprehending one principal town and its suburbs, it consists of a considerable district, extending 25 miles in length from north-north-west to south-south-east, and above 3 miles in breadth, ludes the township or the township of Hanley: the townships of Shelton, Fenton-Culver, and district, the chief seat of England, familiarly known as Burslem, and Tunstall Court. The importance has arisen, the seat. [Earthen- [Burslem.] the extent of a county. The market-town of Burslem has been a market-town for ten years since, and three Methodist meeting-houses. The spacious market-place was formed in 1815. There are a market and court house, with lock-up cells for offenders. The
population of Tunstall-court township in 1831 was 3673, of whom only 19 men were returned as employed in manufac-
ture, two in the trade of manufacturers in the return here. Earthenware and blue tiles are manufactured; and
there are corn-mills and chemical-works. The market is
on Saturday.

These are the principal places in the borough, the total
population of which, in 1831, was as follows:

<table>
<thead>
<tr>
<th>Township</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burslem</td>
<td>2791</td>
</tr>
<tr>
<td>Rushton Grange</td>
<td>1049</td>
</tr>
<tr>
<td>Hanley</td>
<td>1726</td>
</tr>
<tr>
<td>Lane-End</td>
<td>278</td>
</tr>
<tr>
<td>Shelton</td>
<td>71</td>
</tr>
<tr>
<td>Pennkill</td>
<td>1071</td>
</tr>
<tr>
<td>Bothen</td>
<td>21</td>
</tr>
<tr>
<td>Fenton Vivian</td>
<td>153</td>
</tr>
<tr>
<td>Fenton Culver</td>
<td>533</td>
</tr>
<tr>
<td>Longton</td>
<td>1592</td>
</tr>
</tbody>
</table>

7497 564 95 10862 47,916

In the borough, or in its immediate neighbourhood, about
4400 men, with their families, were, in 1831, engaged in the
manufacture of earthenware. A number of men are em-
nployed in the adlos, making the earthenware clays are dug in the neighbourhood. The potters are gene-
really steady men, as attested by the fact that a greater
number reside in houses belonging to themselves, pur-
chased by their savings, than in any other place of equal
size. The adlos, or small plots of ground, on which they raise in rotation crops of potatoes, wheat, and oats; the straw is used in packing the ear-
thenware. The basalt-rods and coping-stones of the surrounding
districts are used in considerable quantity in making crates
to pack the earthenware, and which the ships receive from the
ground, on which the Cohen Canal run through the heart of the Potteries. The Manchester and Birmingham Railway was designed to run through them, but the line has been altered.

The living of Tunstall, the rectory, is, of the clear yearly value of 455s., with a glebe-house; the benefits of the
new church at Burslem is a perpetual curacy, of the clear yearly
value of 109/. The benefits of the new church at Tunstall is
a perpetual curacy. The living of Stoke-upon-Trent is a
rectory, of the clear yearly value of 292/4., and of Lane-End, 184/, each with a glebe-
house. All these places are in the rural desaery of New-
eston, the most fertile and productive of the parishes in the
Kes of Lichfield. There were in the borough, in 1833,
besides private day-schools, two infant-schools, with 164
children; one at Hanley and one at Lane-End; three
national schools, namely, the Hanley and Shelton school, with
108 children; and the Longton school, with 129. To the left
of the Manchester and Birmingham Railway, the Tunstall
boys' school, with 129 boys and 187 girls; and the Lane-End school, with 103
boys and 64 girls; a Lancasterian or British school at
Shelton, with 150 boys and 100 girls, and a Roman Catholic school in Lane-End, with 90 girls. The national schools
are attended by many hundred children in addition on
Sundays, and there are many Sunday-schools, some of them
very large. There are a literary society at Tunstall, and a
mechanics' institution called the Pottery Mechanics' In-
terior. The North Staffordshire Infirmary is in the
street of the town; it is a spacious and commodious brick
building.

The number of voters on the register for 1835-6 was
1463; for 1839-40, 1833, showing an increase in four years
of 591. The number of qualified voters (i.e. houses worth
10l. a year) in proportion to the population is unusually
small, rents being very low, owing to the abundance of building-ground and the cheapness of building materials.
The borough returns two members to parliament.

(STO) STOLE (of the Staffordshire Pottery; Parlia-
mentary Papers.)

STOLE. originally a long vestment, a matron's robe, from the Latin stola, and that from the Greek στολή. Pint-
cus, in his Lexicon Antiquiss. Roman., has a long article
upon it, worn by the ancients.

In later times stole was the term more particularly
called to a broad strip of cloth or stuff, with three crossed
upon it, worn by priests of the Roman church as a sacer-
dotal vestment, with which it was also called Orarium, or Orarium est stole, says Lyndwood, in his Provisors,
"quia sacerdos in omnibus obsequiis divino ui debet, et su-
collis imponitur ut significet se juxta Domini suscepisse."

The stole or orarium, according to Palmer (Origines Liturgiae, vol. ii., p. 318, 318), has been used from the
best primitive ages by the Christian clergy. It is spoken of
by the first council of Braga, A.D. 563; by Isidore Hispan-
ensis, A.D. 600; the Council of Laudes, in Phrygia,
A.D. 369; Severianus Galianus, in the time of Chris-
tosom; and many others (see Bingham's Antiq., b.
ii., ch. 8, § 2; and Herodotus, ii. 210); and it has been conti-
ually used by all the churches of the west and east, and by the Monophysites of Antioch and Alexandria. 'The stole,' says Palmer, 'always called a stola mundana by the Greeks, is one of the
deacon's albe, and hung down before and behind. The
priest had it over both shoulders, and the two ends of it
hung down in front. The Eastern churches call the stole
of the priests ἡμεροθήκης. Thus simply were the dresses
of the deacon and priest distinguished from each other in
primitive times."

The pall of the metropolitan was originally only a stole
wound round the neck, with the ends hanging down behind
and before.

That the word stole, in the sense of a sacerdotal vest-
ment, was of early adoption into the English language, ap-
pears from the 'Saxon Chronicle' under the year 953, when
Archbishop Dunstan, at the time of personally confirming
King Edgar's grant of lands to the monastery of Peter-
borough, added this: 'and after he had given the same,
the deacon and priest.' the mstol to st. Peter. (Ingram's Sax. Chron., p. 156.)

STOLES. (Extrem.)

STOMACH. One of the most constant characters by
which animals are distinguished is the possession of an in-
ternal digestive cavity, which the vegetable food is sub-
jected to a peculiar chemical change before it is appro-
priated to the nutrition of the different parts of the body.
In some animals the chemical change is effected in every
part of the cavity; in others it goes on in one portion of it
exclusively, and this portion is named the stomach. The
forms in each of the chief divisions of the animal kingdom
are considered in their appropriate articles: in the present
therefore, the anatomy and a part of the physiology of the
human stomach alone will be described. Many of the
important facts concerning its office are detailed in the article
DIETITION; but since that was published, the knowledge
of the process had been greatly increased by some researches
into the minute structure of the stomach, the nature of the
digestive fluids, and the results of that digestion: these will
be treated in the present article.

The human stomach is a membranous sac of an irre-
regularly conical form, which lies almost transversely across
the upper and left portion of the abdominal cavity. (Abdomen.)
Its larger extremity is directed to the left, its smaller to the
right, with the right lower border. The stomach is divided
into two parts, the cardia, at the lower left, and the pylorus,
and several semi-circular partitions into the mesogastric
part, the cardia, and the pylorus, and the pyloric (Origme*
from the Greek πετρος, a stone) is a ring-shaped partition
between the pyloric and the duodenum. It is divided into a
number of compartments, each of which contains a number of
scissors-like folds, called rugae; these are separated from
each other by a thin membrane, and covered by a fine cuticle or
epithelium, from which, like all the other organs within the
abdominal cavity, it obtains a perfectly smooth and polished
surface. The peritoneum invests every part of the stomach except
the upper and lower borders, where there are spaces in which
the trunks of the blood-vessels run, and from each of which
the peritoneum is continued in a double layer to form the
greater and lesser omenta. (Omentum.) Its only purpose
seems to be to permit the stomach to move more easily upon
the adjacent organs.

Between the peritoneal and the internal or mucosal

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membrane, there is a stratum of loose cellular tissue, in which are inlaid the fibres of the middle or muscular coat. This is composed of three different sets of fibres, resembling those in their structure those of most involuntary muscles. [Muscles.] The fibres in the first and most superficial layer run longitudinally: they are continued from those of the outer coat of the oesophagus, which, at the cardia, expand or radiate, and pass into the circular fibres from left to right along both the anterior and posterior surfaces of the stomach. The second layer is composed of circular fibres which form numerous fasciculi, each of which encroaches a considerable portion of the circumference of the stomach. The third and internal lamella consists of two principal fasciculi of muscular fibres, which proceed from the cardia and expand over the great curd-de sac and middle portion of the organ. By the differently combined contractions of these fibres, all the motions of the stomach, decided under Digestion, are produced.

The interior or mucous coat of the stomach is that in which the essential apparatus for the production of the digestive material is placed. To the naked eye it appears a soft spongy membrane, about one-tenth of an inch thick, with a polished slippery surface. After death it varies considerably in its colour, but during life has a light pinkish tinge, and, accordingly as the stomach is distended or contracted, is either perfectly smooth or is thrown into various deep and irregular but chiefly longitudinal furrows. At the pyloric end it forms a depression between the two layers of which are strong fasciculi of circular muscular fibres: these constitute the pyloric valve, by which the aperture between the stomach and intestines is guarded. At the cardiac orifice the fibres of the muscular coat are arranged in a spiral, and that of the oesophagus is marked by a jagged line, at which the thick and opaque epithelium of the latter terminates, and the much finer epithelium lining the stomach commences.

The intimate structure of the mucous membrane can be seen only with the aid of the microscope. If its surface be examined with a lens whose magnifying power multiplies diameters about forty times, it appears to be covered by minute polygonal fossae, from \( \frac{1}{200} \) to \( \frac{1}{150} \) of an inch in width, and covered by cilia, to which little leaf-like processes are sometimes attached. At the bases of each of these fossae there are, at least during digestion, from six to ten minute apertures leading into tubes which pass vertically into the substance of the mucous membrane. A thin stratum of the membrane, made perpendicularly to its surface, shows that nearly its whole substance is composed of these tubes, which are minute cylindrical glands, opening on the surface in the fossae just described, but closed below, and set in groups on either side joining together in groups. They vary in length from one-fourth of a line to nearly a line, the longest being situated near the pylorus. Near their bases they measure about \( \frac{1}{200} \) of an inch in diameter, and near their orifices about \( \frac{1}{400} \). Their lower closed extremities sometimes seem to be branched, and to originate in two or more tubules opening by a single orifice. The small blood-vessels pass vertically in the cellular tissue between the groups of tubules from the submucous tissue to the surface of the stomach, on which they form an angular network, marking out the borders of the above-mentioned apertures.

The walls of these little tubular glands are composed, near the surface of the stomach, of a fine structureless membrane, and, at the deeper part, of minute nucleated cells adhering by their edges. Their office seems to be the secretion of the fluid for digestion. In different parts of the stomach, and at different times, they vary in the nature of the substance which they contain; operations depend on aged in producing secretions; others have died in the fresh state: those whose walls lined which invests the stomach are first produced; those, coalescing the cell are de-
nearly always the seven following pairs of limbs are all so formed as to come under the head, and the second

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of any material alteration. In about twenty-four hours, the eye is incapable or completely dissolved, and will have lost many of their chemical properties; the albumen, for instance, being no longer coagulable, but resolved into amos-

zome, salivary matter, and some new substance, while the same materials in the other tubes will be still unchanged. This is also the effect of the artificial fluid, the repeated

fluid are exact repetitions of those described under Digestion as resulting from the gastric juice. To this article therefore we may again refer, only observing that all the facts of artificial digestion render it nearly certain that the simi-

lar changes from those in the living larva is due to no vital property of the gastric fluid, but to its peculiar chemical condition; though in what this peculiarity consists, and whether the acid or the peptic is the actual solvent power will, be necessarily a subject for an additional article.

The best works in which the subjects here considered may be further studied, are Sprott Boyd, On the Structure of the Muscular Membrane of the Stomach, in Edinburgh Med. and Surg. Journal, 1836; Purrkinje, Isis, 1838, and Müller's Archiv., 1839; Bischoff, Uber den Bau der Magenenschleimhaut, Müller's Archiv., 1838; Krause, ibid., 1839, exx.; Eberle, Physiologie der Verdauung ; Schwann, Müller's Archiv., 1836; Watermann, Die Digestione, and the Physiological Systems of Müller and Wagner.

Stomapods of T. M. Molle Edwards comprises in the order Stomapodes all the podophthalmous crustaceans which are deprived of thoracic branches lodged in internal cavities.

**Organization.**

This division is entirely composed of swimming crus-
taceans, whose body is elongated, and whose general form often approaches closely to that of the macrourous decapods; but in those animals the concentration of the rings of the head and thorax is carried less far. In the greater part of the Stomapods the ophthalmic and antennular rings are not carried back to the head, and sometimes acquire a remarkable development. As in the other Podophthalmata, there always exists a carapace, which is formed by the enlargement of the dorsal arch of the antennulae; but the dimensions of the latter are very nearly constant, and the carapace is usually broad.

Sometimes it covers nearly the whole of the thorax, and only leaves a portion of the last ring of that part of the body; sometimes, whilst it prolongs itself above the thoracic rings, it only adheres to those which are near the mouth, and leaves the others free and complete under its lower surface. In other cases it does not reach the four or five last rings of the thorax, which then resemble those of the abdomen. In form it varies too much for general description. The thorax is generally elongated, and entirely covered with articulations movable upon each other. Sometimes all the rings of this part of the body are united into a single piece. The configuration of the abdomen varies still more; this portion of the body presents in general nearly the same disposition as in the macrourous decapods, and termal in the true stomapods is composed of five segments: the sixth ring and the following segment; but in some stomapods the abdomen is rudimentary. The disposition of the limbs is essentially variable. The eyes are always carried on a pair of moveable appendages, the length of which is very considerable, and whose disposition is essentially the same as in the macrourous decapods. The first pair of antennae are rather long, and terminate in two or three multispectral filaments; their peduncle is always elongated and directed backward, and is carried on a gnathocranium, which is quite as in the brachyuran decapods. They are inserted below the eyes, near the median line, or externally to the base of those organs. The second pair of antennae vary still more; their configuration however generally approaches that in the Squilla. The long claw of the first appendage is inserted by its basal part above a great clavate blade, and they terminate by a long multiciliate filament. In the greater part of the Stomapods they are inserted outside the first pair, nearly on the same transversal line. The distance which separates the claws from each other is very great, and is equivalent to that of the mandibles. The carapace rarely recurs below, so as to form a ring which aperture a well defined frame serving to lodge the jaw-feet, as in the greater part of the decapods. In the majority the buccal apparatus is more simple than in the Squilla. It is composed of a pair of mandibles, a lower lip, two pairs of jaws, and a single pair of jaw-feet; these last organs are either altogether wanting, or are transformed into natator feet, and

nearly always the seven following pairs of limbs are all so formed as to come under the head, and the second

pair

pavement. It is also worthy of note, that in the stomapods the second pair of jaws never carry at their base a lamellar appendage analogous to the valvulae, which, in the decapods, fulfills functions so important in the mechanism of respiration; and this is probably one of the simplest cases in which the absence of a respiratory cavity which includes the thoracic branchia, as in the preceding order.

There are generally seven or eight pairs of feet, often presenting the same mode of conformation. They are generally very much reduced; but the first pair, or even the first four, are often prehensile; but they never terminate in a didactylic pincer, as in the deca-
pods: they are subcheliform, that is to say, nothing more than a moveable claw which falls on the preceding joint. The greater part of these organs are approximated to the mouth, or even applied to it; but there is occasionally been the case of the appendage Stomapods. The abdo-

minal members present nothing peculiar; their number is nearly always six pairs. The branchiae of the stomapods are always external, and present in general a more complicated structure than those of the decapods. Instead of being composed of lamellae or simple filaments, they are framed of cylinders ranged in par-

allel order, giving origin to other smaller cylinders, which, in their turn, are equally fringed. Sometimes those ramose branchiae are fixed at the base of the thoracic foot, and suspended under the thorax; but in general they spring from the basilar joint of the abdominal false feet; in some of the order they are reduced to a rudimentary state; in others nothing is to be seen which can be considered as a special organ of respiration; and, in such cases, there is every reason to believe that this function is exercised by the general surface of the teguments.

**Fig. 1.**

**Fig. 2.**

**Branchial Stomapods.**

1, one of the branchiace of Thaumastopoda. a, base of the false foot; b, branchiae. c, d, the two terminal branchiae of the false foot. 2, a, of the branchiace of this ramose branchia. b, the branchiace (remains left) c, one of the abdominal false feet of Ongul. d, a, basilar joint; b, branchia; c, lamellar appendages.

**The apparatus of circulation** differs much from that of the decapods. In the Squilla, the only stomapods which have been anatomically examined, the heart, instead of being divided into a natural structure is a simple organ which, in the normal state, is situated towards the middle of the thorax, has the form of a long cylindrical vessel, which ex-


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stends throughout the length of the abdomen: the arteries which spring from this tubular heart are distributed in a peculiar manner; and the principal venous sinuses, instead of being always provided with the thorax, occupy the abdomen.

**The stomach of some stomapods presents vestiges of the solid framework, which, in the decapods, is armed with teeth serving to bruise the aliments in the interior of the digestive cavity:** but in general nothing similar is to be observed.

**The structure of the liver** also varies; and in those species in which the organs of generation have been ex-


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amined, remarkable peculiarities have been observed in the disposition. The nervous system in this order presents a

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1. 2. 3. 4.
modifications which have not been found in the decapods; but its disposition varies too much to enable M. Milne Edwards to say anything general of it.

Such is the organisation of the stomatopods, as stated by M. Milne Edwards, an order less numerous indeed than the decapods, but comprising crustaceans which differ much from them, not only in general form and in the particular structure of their principal organs.

**SYSTEMATIC ARRANGEMENT AND NATURAL HISTORY.**

The same excellent author, and we can follow none more deeply versed in the subject, divides the stomatopods, after the example of Latreille, into three families:—the Caridodes, the Bicaricassas, and the Unicaricassas.

1. Caridodes Stomatopods.

The crustaceans arranged by M. Milne Edwards under this family bear a close resemblance in their general form, he observes, to the family of Salicoques or Shrimps; and indeed till lately their position had been in the order Decapoda, where they constituted a small and peculiar group, under a single name form and a generator term. But no critical investigations made by M. Milne Edwards with respect to the organs of respiration in these animals, and the discovery of new species which establish a passage between the former and the following, have convinced him of the identity of the decapods and stomatopods, and to place the schizopods in the second of those groups. This innovation, he remarks, has been adopted by Latreille in his last work (Cours d' Entomologie); and that scientific naturalist gave to the new division its present name, Stomatopods, meaning for the rest, the union of those Podopthous Crustaceans which are deprived of internal thoracic branchiae, but are similar to certain Salicoques in their external form, the name of Caridotes from that resemblance.

Body.—Body thick, and slightly compressed laterally; head confounded with the thorax, and all the rings of the last-named part (with the exception, sometimes, of the last, or of the two last) completely united together and soldered above with the carapace. Abdomen considerably developed, and little surpassing by a great lamina, or blades, disposed in a fan-shape, as in Macrourus Decapoda. The carapace descends on each side against the base of the foot; covers the whole, or nearly the whole, of the thorax, as well as the head; and presents, on the inside, a lenticular, or elliptical, ridge; the last appendages composed of a glandular peduncle, or peduncle, and the ophthalamic ring is in general very short and naked. The disposition of the eyes, of the antennae, and of the branchiostegal opercula of the last appendages, constitutes each of a small very short basilary joint, and of two great terminal plates disposed as in the macrourous decapods.

Finally, the conformation of the respiratory apparatus varies: sometimes the branchiostegum do not exist; sometimes vestiges of them are found at the abdominal false feet; and sometimes they are, on the contrary, very much developed, and suspended under the thorax. (M. E.)

M. Milne Edwards divides the Caridodes into two small tribes, the Myisis and the Lithodes.

1st tribe: Myisis.

This tribe resembles the Salicoques so closely, that till lately the species forming it had been arranged under the Macrourous Decapoda, where they constituted the family Decaridides. The general disposition of the thorax has a common origin: the arrangement of the pereiopods is slightly different, as well as that of the pleopods.

Character of the Tribe.—Carapace extending to the base of the ocellar peduncles, and presenting in general in the middle of the front a rudimentary rostrum. Antennæ inserted on two lines and formed as in the shrimps, excepting that the last joint of the first pair is large, and the last joint of the second pair is small. MOUTH situated near the base of these last, and composed essentially of a labrum, a pair of mandibles furnished with a palpirostan stem, a lower lip, and two pairs of lamellar jaws situated at the whole suite of limbs, which succeed to these appendages, belong to the apparatus of respiration but, in other cases, one or even two pairs of these organs constitute jaw-feet, without their form always differing greatly from those of the thoracic feet. These feet each prehend two branches which are well developed and carried on the very short basilary joint, so that they seem to be built from their base. Abdomen of moderate length; false feet fixed to its first rings, sometimes rudimentary. (M. E.)

Under this family M. Milne Edwards arranges the genera

Myisis, Cynthia, and Thyamopoda.

Generie Character.—Body elongated, father Carapaces covering the anterior extremity of the trunk as well as the greater part of the thorax, and bent down on each side as to apply itself against the base of the feet. It is free laterally, and does not adhere to the last rings of the thorax. Antennæ much elongated, their broadened consde is nearly as long as the small flattened and very short rostrum; its posterior border is deeply notched. Eyes large, short, and with their base hidden under the anterior part of the carapace. Interna. Antennæ inserted below the eyes, near the median line; first joint of the palpi short, and of a small length, at its extremity two multiarticulate and rather long filaments. The second pair of antennæ inserted below the preceding, and, equally, directed forwards: the first joint of their peduncle gives origin to a pair of extend forwards to a considerable length. The first pair of jaus each composed of two small flattened blades or flattened lobes ciliated on the internal border. Second pair of jaws larger and much resembling those of Squilla, without cilia, and composed of a pair of flat blades, each composed of two branches; the internal is ciliated, divided into five joints, furnished with hairs, and bent back internally before the mouth; the median branch or palp is more elongated, and presents a very long, thin, and flexible joint; the second extremity is armed with short, thick, and ciliated hairs. Each of the five joints, or their appendages, is composed of members corresponding to external jaw-feet and to the five pairs of ambulatory feet in the decapods, are all slender and divided into two branches; their length increases progressively from before backwards, and they are used in swimming. Each pair of jaw-feet in the last appendages is composed of segments which present one or more partially exposed, resembling those of the abdomen, which is elongated, nearly cylindrical, and gradually narrowed from before backwards: the dorsal portion of these last rings is not prolonged laterally so as to encase the base...
f the false feet, as in the majority of the shrimps; it ter-
minates by a great caudal fin, composed of five blades dis-
posed in a fan-shape, except in the macrourous des-
cendents. Finally, the first five pairs of feet are rudimentary,
tid are only composed each of a small ciliated blade in the
male; but in the male may be distinguished a peduncle
and a terminal blade; the first and last pairs acquire some-
thing a considerable development.

There is no vestige of branchia, either at the vault of
the idea or at the base of the feet, or at the lower surface of
the abdomen, and the only appendage which would seem to be
of the rudimentary character is the little process, which
rest of the body to fulfill the functions of an organ
of respiration, is the flagrum of the first pair of jaw-feet, whose
position, for the rest, is nearly the same as that which
may be remarked in a great number of crustaceans provided
with a pair of well-developed antennule eyes, to the
basal joint of the external branch or palp of the
auxiliary feet, but without supporting this determination by
any argument which might lead one to adopt it.

Such is M. Milne Edwards's luminous description of this
most interesting of the intestinal canals, and it must not
be overlooked the distinguished labours of Mr. John V. Thomp-
son, so well known for his accurate and original observations
dating to the crustacea and other marine animals of the
shallow seas. To the last-named zoologist, more than perhaps
to any other, is due the credit of the first investigations on the
habits of these opossum shrimps, as they have been named
from the pouched or personal nust, above described, provided
or the reception of their eggs and young. He closely
examined the circulation of these animals, and has shown
the sub-division of the thoracic heart; the subdivision of the
thorax. Anteriorly it gives origin to a slender vessel
which has its course above the stomach, and is continued
forward with a large abdominal artery; on each side, it
receives a vessel which appears to branch off the
pouch of the posterior part of the body. The curving of the heart are so rapid that they
semble vibrations, and the blood is so transparent and so
little coloured, that its motion is only to be distinguished
by means of the globules floating therein. Mr. Thomp-
sion remarks, 'all the species from each of the posterior pairs
of the posterior pairs at the end of the tail, a periodical
action may be noticed, as of the opening and closing of a valve
opening on each side, accompanied each time by the filling
of the corresponding end of a vessel of considerable size,
lying on each side of the intestinal canal; and that these
vessels or veins propel the blood towards the heart by suc-
tive contractions of their muscular fibres, and seem to be
lost at length in a great sinus or auricle, lying beneath the
heart. But Mr. Thompson adds that it remains to be ascer-
tained whether it is not also capable of the independent
function, which it is supposed to serve. He thinks however that there can scarcely be a doubt that the
two large veins constitute the tenea portae, and ultimately
send their blood to the branchia.

The same diligent observer thus describes the regulat-
ory process. Attached to each of the inner divisions
of the two posterior pairs of feet in the female, is a large
concave scale, strongly pectinate in front, of which the posterior
is the outermost, largest, and most concave, lapping
considerably over the anterior scale, so as to admit of a
considerable extension of the size of the pouch which they
form by meeting each other in front, in order to accom-
date its capacity to the growth of the ova and young brood.
In the male, in place of the valvular pouch of the female, we
perceive attached to the inner part of the last pair of
feet a number of small hollow scale on each side, ciliate in
front, and provided with a marginal row of slender hooks at
the apex: these are probably an appendage of the male
organs, which have a similar situation in the shrimps.

With the female, the eggs of the embryo are
by Mr. Thompson informs us, are received when ex-
dited from the ovarium, and enveloped in a mucous or
subgelatinous secretion, and gradually developed without
any visible attachment to the parent. The ova var-
iously sized, or may be considered to be considerably
advanced than those of the shrimps, crabs, &c. on their first
expulsion, and by no means so numerous, a circumstance more than
compensated by the rapidity with which one brood succeeds
the other during the whole of the spring and summer months,
the number of broad and small eggs provided by
one individual, as well as the time occupied in their evolution, have not been deter-
minted; but the changes which the embryo undergoes in con-
gregations are sufficiently obvious; in the present instance,
these cannot be considered as metamorphoses, but simply
a gradual development of parts; hence the Schizopaedia
may be regarded as one of the exceptions to the crustacea's
transformations, another character by which they are sep-
able from the true shrimps, &c. The first change which
is perceptible in the ova after their reception into the
mature pouch, is a slight elongation at one end, and the
appearance of two short members on each side, which
indicates, which proves to be the tail, increasing in length,
shortly after becomes forked at the end, accompanied by
a proportional growth in the lateral members, and which
whole is finally concluded, in the perfect an-
imal; the embryo going on thus with a progressive de-
velopment from day to day, begins to assume a more com-
plete form, and an approximation to that of the parent, in
which stages the divisions of the abdomen, the tail, the
organism. Some of the numerous, and the various numbers are sufficiently
distinct; a still more close resemblance to the perfect an-
imal is attained before the young are finally excluded, which
is effected by the parent spreading open the valves of its
pouch, when the whole broad emerge at once into the am-
let element, and, in most of the species, continue asso-
ciated with the community from which they spring:
the slight differences which they now present (and which are
necessary to be known in order to preclude the possibility
of their being mistaken for individuals of a different species)
are of a great importance. The first pair of feet, the
fore part of the brachial limb, the outer antennae, and the tail: the first of these, in place of the
multiarticulate termination, have but one or two
short joints and a curved claw superposed to the end
of the limb, and hence this division of the limb is shorter
in proportion; the sub-limb, or area of the same, is
surmounted by a few bristly hairs; the outer antennae differ
in no other respect than in the ciliated scale which is at-
tached to their base being shorter and less developed, as
may be observed in the articulation. The length of the
tails are proportionally shorter, but yet present
the character peculiar to the species in their form, inden-
tations, and appendages, as so to testify the truth of
Dr. Leach in having fixed upon this part to distinguish
the species that is fundamental. The young are
the embryos is the way in which they are arranged within
the pouch from the moment they assume an elongated
form; their heads being towards the breast of the mother,
with the curvature of the tail part suited to that of the
outline of the pouch, and the large size and blackness of their
eyes.

The different stages of development, &c. are illustrated
by Mr. Thompson, in his 'Zoological Researches,' the work
in which he gives the above description, and which is most
sufficiently available for the investigation of the
most curious and hitherto obscure phenomena mani-

Geographical Distribution of the Genus.—The species
swim freely in the sea in numerous troops, and are par-
ticularly abundant in the north, where, according to Otho
Fabricius, they constitute a principal portion of the food
of the whale-bone whales (balaenæ). James Ross, R.
N., states that Mysis flexuosa (Can.ier flexuosa, Mill.), though but sparingly found in the seas of Europe,
habits some parts of the Arctic ocean in amazing numbers,
and constitutes the principal food of the prodigious shoals
of salmon that resort thither in the months of July and Au-
gust, and upon which the inhabitants of Boottia depend,
in great measure, for their winter store of provisions. He
further observes that it is also the chief food of the whale,
also which such a prodigious quantity of fat is produced in
the body of that immense animal. Captain Ross adds that
during the summer these crustaceans assemble in vast
myriads at the mouths of rivers, but in the winter are
precipitated generally distributed along the whole line of coasts, to-
gether with the Artemis (Cito Maurus of Pallas) and
Gmelin—Hyalella, xii., p. 372), are to be seen
every creek that opens with the tide, even at the coldest
period of the year. The natives call this crustacean It-le-eb-
huk. (Appendix to the Second Voyage of Captain Sir John
Ross.)

M. Milne Edwards divides the genus Mysis into the fol-
lowing sections:—

1. Species which have the middle blade of the anal fin
bi-furcated.
Example. Mysis spinulosa, Leach.

Description.—Rostrum depressed and triangular, and not more than the third of the length of the ocular peduncles. Carapace extending nearly on the penultimate thoracic ring. Peduncle of the internal antenna stout and very short. Lamellar appendage of the external antenna narrow, of the same length (width?) to the end, and clubbed within and at the end. Median blade of the caudal fin furnished with spines on its lateral borders, and deeply notched at the end; internal blades of the lateral appendages narrowing gradually towards the end, and the external blade very obtuse. Length about 10 lines; colour brownish, with a small star in the middle of each of the rings of the abdomen.

Locality.—The British Channel and the coasts of La Vendée. (M. E.)

M. Milne Edwards gives the following as synonyms of this species: Praunus flexuosus, Leach; Mysis Leachii. Thompson (Zool. Res.). Leach's Mysis Fabrici does not appear to M. Milne Edwards to differ notably from M. spinulosa, especially if one may judge of it from the figure given of it by Desmarest; but at the same time, he observes, one ought not to forget that Latreille has represented, in the atlas of the 'Encyclopédie,' the lamellar appendage of the external antenna as being ciliated externally as well as internally; a disposition which, if it really existed, would be characteristic.

Mysis Fabricii magnified. a. The last ring of its body, or its terminal fin; b. base of a lateral antenna; c. base of an intermediate antenna; d. one of the lateral pairs of jaw-feet; e. one of the first pair. Those parts highly magnified. (Thompson.)

2. Species which have the median blade of the caudal fin entire at the end.

Example, Mysis vulgaris.

Mysis vulgaris, magnified. (Thompson.)

Description.—Rostrum moderate; internal antenna short, having their peduncle formed as in M. spinulosa lamellar appendage of the external antenna as in M. longicornis; lateral and middle fins of the caudal fin diminishing gradually in width from their base to their extremity; length about an inch; colour greyish.

Locality. Habits, &c.—Common on the Irish coa. Abounding in the Lee, even up to Cork, from the early part of spring to the approach of winter, according to M. Thompson, who states that during the still period of deep water, they repose upon the mud and stones at the bottom of the river, and, when the wide rising may be served forming a wide belt within its margin, the young swimming nearest to the shore, the oldest farther out as in deeper water. They appear, be added, to be mostly females, and a male, having a few in proportion, and they swim in a horizontal position, contributing towards the food of various young fish, from which they frequently escape by springing up out of the water.

Description.—Rostrum moderate; internal antenna short, having their peduncle formed as in M. spinulosa lamellar appendage of the external antenna as in M. longicornis; lateral and middle fins of the caudal fin diminishing gradually in width from their base to their extremity; length about an inch; colour greyish.

Locality. Habits, &c.—Common on the Irish coast. Abounding in the Lee, even up to Cork, from the early part of spring to the approach of winter, according to M. Thompson, who states that during the still period of deep water, they repose upon the mud and stones at the bottom of the river, and, when the wide rising may be served forming a wide belt within its margin, the young swimming nearest to the shore, the oldest farther out as in deeper water. They appear, be added, to be mostly females, and a male, having a few in proportion, and they swim in a horizontal position, contributing towards the food of various young fish, from which they frequently escape by springing up out of the water.

Example, Cynthia Thompsonii.

Description.—Rostrum very short; carapace extending to the last ring of the thorax, and but little narrowed for...
wards; peduncle of the internal antenna of the length of the lamellar appendage of the external antenna, and having the last joint partly the internal of which is a short, slender, and median blade of the caudal fin long, truncated at the end, and furnished laterally with spines; external blades shorter than the middle ones, and only having hairs or spines on their inner border and at their extremity; middle blades furnished with spines on their inner border; length about four lines.

Localities.—The Atlantic Ocean, between Madeira and the Antilles. (M. E.)

N. B. M. Milne Edwards observes that the **Cynthia** are of small dimensions, and seem to have the same habits as the species of **Mytis**, with which last they are frequently found. He further remarks that the males only have been as yet observed, and that possibly, when both sexes are seen, it may be necessary to modify the characters assigned to this genus.

**Thysanopoda. (M. Edwards.)**

M. Milne Edwards states that those crustaceans resemble the shrimp greatly in the general form of their body, but are distinguished from the Decapods by the Stomatopods, by the disposition of their respiratory apparatus. The branchi, he tells us, are each composed of a kind of stem, whence spring, at a right angle, a certain number of lateral branches, whose anterior border is fixed in the form of a tuft of lateral filamentous. This mode of organization is, he observes, very analogous to what may be seen in the **Squillae**, but the branchiae (see the cut, p. 77), instead of being inserted in the abdomen, as in the *Squillae*, are directed outwards, like *Notocaris*. The anterior part of the body, as in the Decapods. Nevertheless they are not enclosed in particular cavities, as in that order; they are situated on the exterior of the body, and float freely in the water with which the animal is bathed. They are fixed at the base of the eight pairs of thoracic feet, and their length increases from before backwards.

**Generic Character.**—External form resembling that of **Myatis**. Body presenting the same divisions as in the merourenous Decapods. However, the cephalothoracic, being only one short segment of the whole of the thorax. Abdomen, whose length much exceeds that of the cephalothoracic, extends backwards, and composed of seven segments, the three median of which present on their posterior and superior borders a short spine, directed backwards. Carapaces terminated anteriorly by a small pointed rostrum, which does not reach to the extremity of the eyes, whose peduncles are stout and short. Antenna four in number, inserted on two lines, and nearly equal in length; the upper with a prolongation of the cephalothoracic, the lower composed of three cylindrical joints: they are terminated by two rather long filiform stems. Base of the lower antennae covered by a long lamellar scale, the extremity and internal border of which are clipeal, the terminal process being of the same form. Mouth situated at a small distance from the point of the insertion of the lower antennae, and surrounded, as ordinarily, with a rather stout lamina, a bifid tonguet, and a pair of mandibles, which are armed on their posterior and inner side with some pointed teeth, and carry a short and flattened palp, divided into three joints. Two pairs of jaws are applied on the mandibles and tonguet.

The first pair offer nothing remarkable. The second are composed of three lamellar joints, the two first of which are bilobated on the internal side; no trace is here to be seen of the great foliose appendage which always exists on the external side of these organs in the Decapods, and which assists in the mechanism of respiration: their form and structure are absolutely the same base of these feet 400, Aelmo, &c. The eight pairs of limbs which succeed the jaws, and which correspond both with the jaw-feet and ambulatory feet of the decapod crustaceans, have here all the same form and the same uses: not one of them enters into the composition of the abdominal appendages, but serve to the thorax.

These feet, with the exception of the last pair, are long, slender, and bifid, as in **Myatis**. Their basilar joint, stout and short, carries within a long stem, furnished with numerous hairs, and externally a palp or middle branch, which possess the aperture of which is directed outward, and ciliated on the borders. The length of these natatory feet increases a little from the first to the fifth pair, and then diminishes; those of the eighth and last want an internal stem, and consist only of the external branch or palp. The five first segments of the abdomen support also small natatory feet, formed of a cylindrical peduncle, carrying two elongated and ciliated blades on the borders, the inner of which is longer than the external, and which turn a small cylindrical appendage. The limbs of the sixth and seventh rings of the abdomen become lamellar, constituting a fan-shaped fin, the median narrow and pointed piece of which terminates in three sharp spines; and the lateral ones, equally long, are furnished on the borders with long hairs. (M. E.)

**Example,** **Thysanopoda tricuspidata,** the only species known. Length about 13 lines. Location.—Found far at sea in the Atlantic Ocean.

M. Milne Edwards thinks that the genus *Podoposis*, or Hammer-headed Shrimp of Thompson, may belong to this family; but he observes, that it is too imperfectly known to warrant the assignment of precise characters to it. This crustacean, which is frequent in the Indian, Atlantic, and Pacific Oceans, is phosphorescent, and is figured and described in the interesting Zoological Researches above quoted.

2nd Tribe. **Luciferians.**

M. Milne Edwards observes that the genus *Lucifer*, established by Mr. Thompson, is one of the most singular known; and as it does not, without difficulty, admit of arrangement in any of the tribes already established, M. Milne Edwards, though he remarks that its history is still very incomplete, is of opinion that it should be taken as the type of a particular family, in which he finds figures of crustaceans in the atlas of Kruseenstern's "Voyage" ought to be referred.

Mr. Thompson states that this singular and extraordinary type of crustacean, to which he has referred in his Zoological Researches, conduces to the sparkling appearance of the sea in the tropical regions, and the individual figured by him (see cut) was taken in the Atlantic, in 25° 56' N. lat. and 32° 55' W. long.

M. Milne Edwards observes, that one of the most remarkable traits of this crustacean is the excessive length of the anterior portion of the head; the extreme brevity of the part of the body occupied by the mouth, and constituting the thorax; and the great development of the abdomen.

**Generic Character.**—M. Milne Edwards observes that the description is more full than that of Mr. Thompson, and who records two species, *Lucifer Reynaudii*, and *L. Typus*, states that the general form of the body is nearly linear. Eyes and Antennae carried at the extremity of a long, slender, and cylindrical prolongation, which is much longer than all the rest of the cephalo-thoracic portion of the body, and seems to be formed principally by the antennary ring. A small carapace covers the whole of the posterior portion of the body, where the mouth and mouthed parts are situated, close to the preceding, and are equally slender: near their base is seen a small lamellar appendage, but their mode of termination is unknown. Mouth projecting and situated behind the base of the prolongation, which carries the eyes, &c. Here are found mandibles, which are strong and toothed, but deprived of a palpiform stem; two pairs of jaws, each bearing two blades; two pairs of short and lamellar jae-feet, and one pair of external jae-feet, which are long, pediform, and bent back against the mouth. In succession to these organs may be seen four pairs of long and slender natatory feet, which gradually lessen towards the end, and are furnished with scattered hairs. M. Milne Edwards could not find any vestige of a palp or a flagrum at all, and attributes the existence of the last pair of feet, which are here wanting to complete the normal number of the thoracic feet; but he observes that in the figure given by Mr. Thompson, there is at the posterior part of the thorax, nearly in the middle of the appendages. The abdomen is very narrow, and is composed, as ordinarily, of seven rings, but acquires a development entirely abnormal; for each of these segments is at least as long as the whole cephalothoracic appendages, and presents a peculiar portion of it; the cephalothoracic, which is the prolongation of which is directed outward, and ciliated on the borders. The length of these natatory feet increases a little from the first to the fifth pair, and then diminishes; those of the eighth and last want an internal stem, and consist only of the external branch or palp. The five first segments of the abdomen support also small natatory feet, formed of a cylindrical peduncle, carrying two elongated and ciliated blades on the borders, the inner of which is longer than the external, and which turn a small cylindrical appendage. The limbs of the sixth and seventh rings of the abdomen become lamellar, constituting a fan-shaped fin, the median narrow and pointed piece of which terminates in three sharp spines; and the lateral ones, equally long, are furnished on the borders with long hairs. (M. E.)

**Previously used for a supposed genus of Conchifera.** (SCHNITZER, vol. xxii. p. 271.)

Vol. XXIII. — M.
M. Milne Edwards presumes to be males, the first pair of false feet present towards the middle of their basal ring, a flabby appendage of odd shape (forme bizarre). The sixth ring is compressed, very long, and toothed below. The abdomen is terminated by a caudal fin, composed, as ordinarily, of five blades disposed in a fan-shape. M. Milne Edwards did not find any vestige of thoracic branchial.

Example, Lucifer Typhus. The same author states that this species differs from Lucifer Reynaudi (which was found in the Indian Ocean by M. Reynaud) in the form of the median piece of the caudal fin, which is lamellar, and without any notch below, in the more considerable length of the middle blades, and in the apparent absence of a separation between the carapace and oculiferous prolongation.

Lucifer Typhus, or Long-headed Shrimp, magnified, and of its natural size. (Thompson.)

The crustaceans numbered 9 and 10 in the atlas of Krusemanna's "Voyage" are those which, according to M. Milne Edwards, belong to this genus.

II. Bicirrurated Stomatopoda. [PHYLLOSOMA.]

M. Milne Edwards remarks, that the crustaceans of this family are provided with a sufficiently large carapace, but that they nevertheless approach the Edriodophthalmi in the conformation of the thorax, for the greater number of the rings of this middle portion of the body are complete, moveable, and naked, or merely covered by the dorsal buckler without any adhesion to it. The independence of the first segments of the body is carried even farther, he observes, in these crustaceans than in any other, for in the greater part of them, not only the ophthalmic ring, but also the antennular ring remains free, and in some there is a transversal piece at the base of the second pair of antennae, which seems to be the representative of the lower arch of the third cephalic ring, and not soldered, as ordinarily, with the succeeding ring, of which the carapace is an appendix. Frequently all the thoracic and cephalic rings situated behind this last are equal distance from each other and more or less movable, but, with the exception of the fourth last, they are incomplete above, and represented only by their sternal arch. The abdomen is always very well developed, and is composed of seven movable segments, the last of which constitutes a very large caudal blade. The eyes are stout and convex (renflés) towards the end; the first pair of antennae are inserted below and behind their peduncle, and are composed of a cylindrical peduncle formed of three joints and terminated by three filaments, which are ordinarily developed.

The second pair of antennae are inserted behind and outside the preceding, and are provided with a great lamellar appendage fixed on a stout and cylindrical joint at the extremity of the first joint of their peduncle, which also carries in front a filament which is, ordinarily, much smaller. The mouth is rather distant from the antennae, and carried on a nearly triangular eminence, the base of which corresponds with the insertion of the prehensile foot. The upper lip is large, projecting, and semicircular. The mandibles are directed downwards and terminate by two broad branches, one of which is situated behind the mouth, towards the stomach; the palpiform stem which carries these organs is small and sometimes null. The lower lip is large and partially covers the extremity of the mandibles. The jaws are very small and applied exactly against the edge of the carapace; the first pair terminate by a kind of hook directed inwards, and armed with spines along the internal border of their second joint; there is also a small rudimentary palpiform appendage. The second pair of jaws are lamellar, nearly triangular, and resemble two or five joints placed end to end; nothing resembling a flabelliform appendage is to be seen. The members which belong to the seventh cephalic ring, and which, ordinarily, constitute the anterior jaws, do not seem to belong to the buccal apparatus; they are united to the thorax to form a pair of slender feet, generally enlarged towards the end, the uses of which are not known. The thoracic limbs of the first pair, which are the analogues of the second jaws of the Decapods and of the anterior feet of the Edriod- blasm, are largely developed and composed great radiofeet (ramiozea), the last joint of which bends back a long claw along the internal border of the preceding joint and forms, after a fashion, a kind of pincher which the animal uses either for defence or the seizure of its prey. The three succeeding pairs of feet are much smaller, that is, in some sort brought forwards as, ordinarily, to occupy a reversed transversal line, and place themselves between the base of the raptorial feet; they are, in general, applied upon the mouth, and appear to serve only for the prehension of the kind or small animals which all terminate in a kind of arm armed with a movable claw, disposed so as to bend itself back against its internal border. These five pairs of limbs carry at their base, on the external side, a membranous vesicular appendage, flattened into the form of a disk and pediculated, which is the analogue of the flagrum, and which, according to some authors, may be a respiratory organ. The three last pairs of thoracic feet are rather distant from each other and directed downwards; they are slender, lamellar, and nearly square, added with a styloform appendage which springs at the extremity of their second joint. There are six pairs of abdominal limbs; the five first pairs are formed nearly as in the macrourous Decapods, except that their peduncle is much wider, and that in general they have a definite insertion to the thoracic limbs, the appendages of the sixth abdominal ring concur to form the caudal fin; they are directed outwards and terminated by two coiled blades, between which is a great lamellar prolongation of the basal joint; the external branch of these false feet is, ordinarily, composed of two joints. There is sometimes on the posterior border of the last segment of the abdomen a pair of moveable spines which may be considered as vestiges of a seventh pair of abdominal limbs. Between the thoracic and abdominal limbs, and composed of a great number of small cylinders, carried on stemmata which in their turn are supported from a stouter stem (see cut, p. 77); sometimes these organs are completely wanting or do not exist except in the state of vestiges, but, in general, they are highly developed. They are directed under the abdomen, not at the base of the external blade of the five first pairs of false feet, and float freely in the water.

M. Milne Edwards divides this family into two small tribes, Eriothriinae and Squillinae.


Corresponding with the genus Squilla of Fabricius, and the majority of authors, this tribe comprehends, according to M. Milne Edwards, the genera Squilla (containing the Squilla, properly so called, Gonodactylus, and Cornes of Latreille. All these crustaceans have, observes M. Edwards, the greatest resemblance to each other, and the differences upon which these genera are established have not perhaps as much importance as was once thought.
The Squillians, says the author last quoted, are, of all the podophthalmous crustaceans, those in which the various constituent rings of the body are the most equally developed and the most independent parts of the animal; in the exclusion of those which immediately surround the mouth, all these rings are more or less moveable on each other, and the greater part are complete. The carapace neither covers the two first rings of the head nor the four last rings of the thorax, and constitutes a horizontal buttress nearly quadriangular, which is divided longitudinally into three lobes, more or less distinct, by two longitudinal furrows. In front of this buckle is a small triangular and moveable plate, which seems to be a dependence of it, and which covers the anterior part of the second ring, and the anterior portion of the second lobe, and continues itself with an articulation equally stout, which carries at its extremity a great oval blade, analogous to the palpi or middle branch of the thoracic limbs, and the basiaxial scale of the external antenna of the shrimps; the latter, as we have seen, is one of the body, the former remains here slender and so small, that it only belongs to be an appendage of the middle branch; it springs from the anterior angle of the common basiaxial joint, and presents a peduncular portion, composed of two cylindrical joints united in an oval manner; on each of these the basiaxial scale is very much elongated and constitutes a great projecting mass nearly triangular, the base of which directed backwards forms the upper lip. The mouth is situated towards the middle of the head, which seems to have a tendency to move inside a mandible furnished with a small palpiiform stem, which is directed forwards on the sides of the epistome; these mandibles are vaulted, and terminate in two diverging branches with dentilated borders, one of which ascends vertically in the interior of the onychopod, a lower lip, deeply bilobed, closes the mouth behind, and is applied against the mandibles. The first pair of jaws are small, and furnished within with a denticulated lamina on the border, and with a conical lobe bent back upon itself, and terminated by a sand-like protuberance; these united form a mandibular appendage. The second pair of jaws are more developed, and cover the whole of the rest of the buccal apparatus; they are lamellar, nearly triangular, and composed of many joints placed end to end. The members, which unites to the anterior part of the buccal valves, and is the preceding tribe, two long, slender, and cylindrical feet, which advance on each side of the head, and bear considerable resemblance to the external jaw-feet of certain macrourous decapods; the vesicular blade fixed to the base of these organs is rather large. The succeeding pair of limbs, which in the decapods constitute the anterior jaw-feet, acquire here a great development, and take the form of raptorial or captatory feet; they are in general bent back thrice upon themselves, and form the type of the genus Manis or Manita [Manita], the conformation of their claw varies a little, and thus furnishes characters for distinguishing the true Squillae from the Gonodatyli. The three succeeding pairs of thoracic raptorial feet, are directed forwards, and applied against the buccal apparatus; they are inserted upon a semicircular line, and the last touch at their base and are brought between the preceding, so that the thoracic ring to which they belong seems at first sight to be apod; their exoskeleton is essentially the same as in the preceding tribe. The same is the case with the three last pairs of thoracic feet; only they are more developed than in the Eriodactyls; their appendage is sometimes stylistiform, sometimes enlarged, and furnished with tubercles or thorns, which term the outer border, and slightly dilated on the border. The rings which carry these three last pairs of feet, and even that which precedes them, resemble almost entirely those of the abdomen, only they descend but little or not at all laterally on the outside of the insertion of the limbs. The abdomen is very large, and consists of four rings. The first two rings, the internal branch consists, as ordinarily, of several blade, with ciliated borders; but, as in the preceding tribes, the external branch is composed of two joints placed end to end, of which the first is of some size, and the second lamellar. The false feet of the five first abdominal rings are very large; the third, the second; the fourth and fifth, are two lamellar branches, the external of which gives attachment to their posterior surface, close to its peduncle, to a great ramose branchia disposed in the form of a plume. The same author observes that the internal structure of the Squillians differs considerably from that of the decapods. The heart, instead of being quadrilateral, and enclosed in the middle part of the thorax, has the form of a long vessel, rather enlarged anteriorly, which extends nearly throughout the length and the viscera, to remain as well as of the thorax, and which furnishes laterally in each of the rings which it traverses a pair of arterial branches; by its anterior extremity, this dorsal vessel gives origin to three branches, which seem to be the analogues of the ophthalmitic and antennary arteries of the crustaceans. On each of these passes a small artery which penetrates into the last abdominal segment. The venous sinuses, in which the blood collects before it goes to the branchie, are extremely large; the principal cavity belonging to this system occupies the median portion of the transverse trunk, and extends longitudinally as far as the lateral muscular masses of the abdomen; its lower wall is formed by a blade of cellular tissue, which encloses in its thickness the ganglionary nervous eord, and which is joined (eossides) to the tegumentum of the lower surface of the abdomen; these latter vessels are of the same kind, and are covered with a thin lamellar incusum which surround the base of the false feet, and lead to the branchie. The peduncle of each of these last organs encloses two longitudinal vessels, the external of which passes to the hollow of the segment, and opens into the internal the efferent canal: this last conduit is continued in the part of a tube, with walls formed only of very fine cellular tissue, and which ascends on the lateral parts of the abdomen, and plunges between the upper longitudinal muscles of the body, and is divided into two very small cavities, one to be the liver, and which gives origin laterally to small prolongations which insinuate themselves between the muscles of the base of the feet. The stomach is very large, and advances into the head very far before the onychopods, which is vertical and extends over the upper part of the abdomen, appears to be much less complicated than in the decapods, and is reduced nearly exclusively to the subpyloric portion, which forms a species of valvule in front of the entrance of the intestine. Thus this tube is straight, and is surrounded with a thin lamellar sac to be the liver, and which gives origin laterally to small prolongations which insinuate themselves between the muscles of the base of the feet. This organ, according to M. Duvernay, is a nervous sinus; but M. Milne Edwards thinks that the appearance which gave rise to this opinion depends on alterations which take place in the Squill after death, for the results of the dissection of several fresh individuals appeared to the latter incompati- ble with this new determination proposed by the assistant professor of Strasbourg, de Mere (Comptes Rendus, 1837, &c.). The organs of generation are situated above the digestive apparatus. In the male there issues from the base of each of the posterior feet a long slender cylindrical and white tube, which, in making a great number of evolutions, unites to the exterior of the abdomen, and terminates anterior third of the abdomen in a whitish and lobulated mass, which is the analogue of the testicle, and which extends to the anterior part of the abdomen. The tube is of the form of a round cylinder, of the length of which is often the double of the tube of the testicle, and is considerably. The ovary occupies the same place as the testicle, but is larger. The nervous system presents several at the same disposition as in the greater part of the macrourous decapods; in the abdomen the ganglia are well developed, and the cords are double; it is the same with the thoracic ganglia of these three last pairs, but all those of the anterior portion of the thorax are united in a single oval mass.
Genera.—Squilla; Gonodactylus; Coronis.
Squilla. (Rodeletius.)

M. Milne Edwards points out that the true Squilla are probably more carnivorous than the other crustaceans of this tribe, for they are furnished with much more powerful offensive arms. The claw which terminates their raptorial foot has a falcate form, the sharp edge of which is provided with long pointed teeth, and can be received into a groove of the corresponding border of the hand, which is equally compressed, and in general armed with spines on its prehensile border. The three last pairs of thoracic feet carry a slender, cylindrical, and elongated appendage, which represents the palp. The body is in general more slender and narrowed behind the carapace than in the other Squillas.

Locality. Habits, &c.—Squilla show themselves in the British Channel; but the species which are numerous are abundant only in the seas of warm regions; they keep in general at a distance from the coast, and at considerable depths. Their abdominal false feet are continually in motion, and they swim with great swiftness, striking the water with their powerful tail.

M. Milne Edwards divides the true Squilla into two subgenera:—1, Squilla Finet-taillesi; and, 2, Squilla Trapeses.

1. Slender Squilla.

The species arranged by M. Milne Edwards under this subgenus are remarkable for the narrowing of the posterior portion of their thorax and the gradual enlargement of the abdomen. The carapace, enlarged backwards, hardly reaches the anterior edge of the thoracic ring which precedes the three last segments provided with feet. The rostral plate hardly ever covers the ophthalmic ring. The last segment of the abdomen is never furnished with movable marginal spines. The subgenus is divided by M. Milne Edwards into the following sections:

a. Species whose abdomen presents above neither crests nor large tuberces, and has its last segment twice as wide as it is long; rounded and hardly dentilatated.

Example, Squilla maculata. Length from ten to twelve inches, and rather more. Colour yellowish; with three bluish bands on the carapace and a similar transversal band on the articulation of the rings of the abdomen.

Locality.—The Asiatic Seas.

b. Species whose abdomen presents above many longitudinal crests, or large elongated tuberces, and has its last segment in general nearly as long as it is wide.

* Rostral plate not covering the ophthalmic ring.

Example, Squilla Manitis. Length six or seven inches and upwards. Colour very pale yellowish grey.

Locality.—The Mediterranean.

** Rostral plate entirely hiding the ophthalmic ring.

Example, Squilla Berusseci. Length about four inches. Moveable claw armed with three teeth only. Colour purplish washed with greenish.

Locality.—The coast of Sicily.

2. Stout Squilla.

This subgenus has the body very convex, all of a size, without any notable narrowing at the back part of the carapace. The posterior portion of the thorax is as wide as the abdomen, and the carapace reaches ordinarily to the antepenultimate thoracic ring. The rostral plate covers the ophthalmic ring entirely. The two posterior teeth of the last ring of the abdomen carry each at their extremity a movable spine.

Example, Squilla italicus. Last segment of the abdomen furnished above with seven delicate crests; two moveable spines inserted near the median line. Length about three inches.

Locality.—The Isle of France.

Gonodactylus. (Latreille.)

This genus bears a strong resemblance to the Stout Squilla (Squilles Trapeses). The principal distinction lies in the mode of conformation of the raptorial feet. The last joint of these organs, in lieu of having the claw bisemellar and strongly dentated, is straight, stiltiform, more or less convex at its base, and presents at most only vestiges of teeth on its prehensile border, which is enlarged. In general the convexity of the basislary portion is very considerable, and suffices to distinguish these crustaceans at the first glance.

* Rostral plate armed on the median line with a long spiniform tooth.

Example, Gonodactylus Chiragra. Length about three inches and a half.

Locality.—Probably all the seas of warm climates; Mediterranean, American coast, Seychelles Islands, Trommolees, and Tongaraboo.

** Rostral plate rounded and nearly pointed in front.

Example, Gonodactylus Scyllarus. Length about four inches and a half.

Locality.—Indian Seas and the coasts of the Isle of France.

Coronis. (Latreille.)

This form does not appear to M. Milne Edwards to differ sufficiently from the Squilla, properly so called, to authorize its generic separation; but as he had not observed it himself, he continues to retain it as a genus. The following is Latreille's character:

The posterior appendage of the third joint of the six last feet (the adactylus and thoracic) in form of a membranous blade or battledore (palette), which is nearly orbicular and a little bordered (rebordce).

Example, Coronis Scapul progena. (See Guerin, Iconographie, pl. 24, fig. 2.)

STOMATE/LIA. [HALJOTLIDE, vol. xii., p. 16.]

STOMATES (from the Greek στόμα, an 'opening,' or 'mouth,'), in Botany, are small longitudinal openings occurring in the epidermis of plants, and usually bounded by two or more lunate or kidney-shaped vesicles. The epidermis of plants has been described by Bronniquart and others as consisting of three parts, which may be easily demonstrated by a lengthened maceration. The outermost of these consists of an 'extremely delicate homogeneous pellicle,' which does not present any decided marks of organization, and is perforated in places where the stomates exist. The second part consists of a single layer, sometimes of more than one, of flattened vesicles of cellular tissue. These vesicles are very small, and of various figures, but the most frequent form is the hexagonal. The third
part of the epidermis is the stomata, which are placed under the above-mentioned pellicle and on the same plane with the layer of flattened vesicles.

The first botanist who observed the existence of stomata was Gesner, in his 'Anatomy of Plants,' published in London, in 1632. In the stem and leaf-galls, and the embryo of these organs, and stated that they existed on several parts of plants, but he gave them no especial name. Malpighi afterwards described their existence in the epidermis of roots, and stated that they were the openings made by the vascular threads. These stomata were first observed by Sir W. Hooker, whose name is perpetuated in the genus, and he further observed that they were much larger in the higher plants. Guettard was the next writer who noticed them, and, believing them to perform the office of glands, called them glandes mitilares (glandular miliares). Saussure also thought they glandular miliares. Dr. Encke first observed the stomata in the epidermis of the leaves, and he and others noticed that they were more numerous in the leaves of the aquatic plants than in those of land plants. This opening communicates with the parenchyma of the leaf or other organ underneath the cuticle, and at this point the cellular tissue is loose, and frequently a large stomate is present. This stomate is circularly disposed, has a well-rounded rim or edge, and is enclosed in a cuticle, which was discovered by E. W. de Vries. Brown and others denied at first that the cuticle was continuous, but that the stomates were openings in the leaf, and the observation of later writers seems to have proved this point. (Lindley, Introd. Bot., p. 52.)

The stomata are not all composed of two cells; those of Marchantia, according to Mirbel, are composed of four or five cells, which are arranged circularly, forming an upper outer rim of the stomate. Sometimes additional cells are found above these, but they differ little, except in their larger number. The division of the leaf by them is less perfect than in the other plants, and they are surrounded by the cuticle. This is one of the simplest forms of stomata. In Nereum selerianum the stomates consist of cavities in the cuticle, which are filled up with little hairs. Dr. Lindley has described in Nepenthes two sorts of stomata, the one oblong, semitransparent, and almost colourless, with numerous pellucid globules in the cavity of the cells; the other roundish, much more opaque, and coloured red. The opening in the stoma is formed by the epidermis, as in Oncidium altissimum, and Link has noticed them in a quadrangular form in Vicia gloriosa.

The stomata are mostly arranged irregularly upon the surface of the epidermis, occupying generally about equal parts of the surface, and their number varies with the species, but in the same plant they may be seen to be grouped into regular elongated rows, or to form small regular spots. They are found on leaves, flowers, stems, and in the epidermis of the seeds. They are of more importance in the physiology of plants than is yet generally supposed. They are probably of great importance in the life of the plant, and their importance is increased by the fact that they are not always present on the upper surface of the leaf. They are, however, so much more frequently absent on the upper than on the under surface of the leaf.

The number of stomata contained in a given surface varies very much in different species and families of plants. Many observers have occupied themselves with counting them, and the following table gives the result of some of the observations of Sprengel, Kroeker, Thomson, and Lindley on this point:

<table>
<thead>
<tr>
<th>Name of Plant</th>
<th>Number of Stomata in a Square Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lilium album</td>
<td>17,280</td>
</tr>
<tr>
<td>Tradescantia discolor</td>
<td>53,000</td>
</tr>
<tr>
<td>Alisma Plantago</td>
<td>10,710</td>
</tr>
<tr>
<td>Andromeda species</td>
<td>16,000</td>
</tr>
<tr>
<td>Hydrangea quercifolia</td>
<td>140,000</td>
</tr>
<tr>
<td>Semprevivum tectorum</td>
<td>6,000</td>
</tr>
<tr>
<td>Rumex acetosa</td>
<td>20,000</td>
</tr>
<tr>
<td>Vesica album</td>
<td>200</td>
</tr>
<tr>
<td>Prunus Laurocerasus</td>
<td>90,000</td>
</tr>
<tr>
<td>Crinum amabile</td>
<td>20,000</td>
</tr>
<tr>
<td>Stapelia (stem)</td>
<td>20,000</td>
</tr>
<tr>
<td>Cactus (stem)</td>
<td>15,000</td>
</tr>
<tr>
<td>Aloe (leaf)</td>
<td>20,000</td>
</tr>
<tr>
<td>Yucca</td>
<td>40,000</td>
</tr>
<tr>
<td>Pinus tepphensis</td>
<td>2,700</td>
</tr>
<tr>
<td>Abies</td>
<td>3,000</td>
</tr>
<tr>
<td>Aloe nigricans</td>
<td>7,200</td>
</tr>
<tr>
<td>Citrus aurantium</td>
<td>409,824</td>
</tr>
<tr>
<td>Solanum sanctum</td>
<td>46,704</td>
</tr>
</tbody>
</table>

Meyen, who records Kroeker's calculations, does not state on which side of the leaf he observed the stomata.

Brown is of opinion that the figure and size of stomata might often be made use of to indicate the affinities of genera and natural families of plants, and has proved that this is the case in Proteaceae. Schleiden also, in a recent paper, has pointed out the relations and differences of these organs in Cactaceae, Coniferae, Piperaceae, and other orders.

The different names that have been given to the stomata by various writers will at once indicate the differences of opinion that have existed with regard to their functions. It is now known that they are excretory, and not merely of excretion, but that they are the excretory organs of plants. The stomata are precisely similar to that of many of the glands of plants, and that supporting the stomata were only looked upon as organs by which exhalation is effected, yet that process is not so much a function of the stomata as a function of the leaves. It is for this reason that he still calls them Hautdrüsen (skin-glands), and looks upon them as excretory organs.

Bonnet found that leaves when flagging were restored by placing one of their surfaces in water, and hence he concluded that only the functions of the stomata are to absorb moisture from the atmosphere, but the hygroscopicity of vegetable tissue would account for this absorption.
that the central portion of the temple is comparatively in a much more ruinous condition than the two principal circles.

No. 3.

Stonehenge.—Perspective Elevation.
No. 4.

The plans (1 and 2), perspective view (3), and section (4), render it unnecessary to give a description of the present state of Stonehenge. The dimensions of the stones, and the space occupied by the structure, as nearly as they have been ascertained, are—

Diameter of the space enclosed within the vallum or bank . . . . . . . 300 feet.
Height of vallum . . . . . . . 15 feet.
Diameter of the outer circle . . . . . . . 100 feet.
Do. of the second circle . . . . . . . 83 feet.
Height of the stones of outer circle 14 (sides 7 feet by 3). Do. of trilithons . . . . . . . 16 ft. 3 in., 17 ft. 2 in., 21 ft. 6 in. Do. of one of the small stones before the same . . . . . . . 7 ft. 6 in.

The stones of the outer circle, the trilithons, the stones in the avenue, and their adumbrating the valley, are, according to Dr. Townson, in 'Tracts and Observations on Natural History,' &c., a pure, fine-grained, compact sandstone, differing only a little in their colour, some being white, and others inclining to yellow. They precisely resemble the grey-wethers and numerous other detached masses which lie on the surface of the downs in the vicinity of Avebury and Marlborough. The stones of the second circle, and the row within the trilithons, consist of a fine-grained granite, interspersed with black hornblende, felspar, quartz, and chlorite, excepting four in the circle, one of which is a siliceous schist, another an argillaceous schist, and the others hornstone, with small specks of felspar and pyrites. The slab or altar stone is different from all these, being a kind of 'grey cos, a very fine-grained calcareous sandstone,' which strikes fire with steel, and contains some minute spangles of silver mica.

The surrounding plain is covered with a profusion of barrows and earth-works, perhaps unparalleled in any spot of similar extent in England, and probably in the world. Many of the barrows were opened by Sir Richard Hoare and his indefatigable coadjutor Mr. Cunnington, and were found to contain, in some instances, cists or chests, filled with burnt bones, and in others entire skeletons, with various relics of British and Roman art. Some other objects besides the barrows demand our notice. The principal of these are the avenue and the cursus, the former of which has been previously noticed. It is a narrow strip of raised ground, bounded on each side by a slight bank of earth, and extending in a straight line from the entrance, through the vallum of the structure on the north-east, to the distance of 594 yards, at which spot it divides into two branches, one of which continues southward, and is seen between two rows of barrows; while the other proceeds northward, and approaches within a few yards of the cursus. The cursus is a very curious and interesting appendage to Stonehenge, if it can be properly so considered. It is a flat tract of land, bounded by two parallel banks and ditches, and is situated about half a mile north-east of Stonehenge: it measures one mile five furlongs and 176 yards in length, and 110 yards in breadth. Its direction is from east to west, and at the former extremity is a mound of earth resembling a long barrow, which stretches entirely across it. The western extremity is destitute of any mound like that at the eastern end, but there

With respect to the two principal circles, the restorations given by Stukeley, Inigo Jones, Wood, and Smith, vary in no essential particulars; but as regards the number and arrangement of the trilithons, and the small upright stones before them, they differ materially from each other. Jones, for instance, made the number of trilithons et seq. The plan No. 1 (from Stukeley) seems fully justified by the existing remains, as shown in plan No. 2, whilst the discordant opinions on this point are easily accounted for by the facts...
are two barrows irregularly placed near this end within the area of the cursus, a part of which appears also to be cut off by a slight bank. The original purpose of this bank is difficult to determine, for we can scarcely suppose that if the chieftains from the east end, they would be driven one by another in the last end of this tract.

If this bank was the last end of the tract, the cursus would be cut off by a slight bank at the last end of this tract. We should therefore be inclined to think that it had been raised at a later period, for some object distinct from racing, if there were not another similar bank turned across a second and a third tract, which is situated at the distance of some miles and the distance of some miles from the larger one. From the near resemblance of the above work to the genuine circus of the Romans, it is reasonable to suppose that, if not formed by the Romans, it was made in imitation of their chariot-course, and by the Britons or Gauls with their many chariot races. However, the "Antient Wiltshire" contains a very interesting map, showing the surface of the plain around Stonehenge to the extent of about five miles from east to west by three miles from north to south. Within that area are two large monuments, two curasses, other embankments supposed to mark British villages, and at least three hundred barrows or tumuli of various sizes and shapes. Hence it may be reasonably inferred that Stonehenge was a place of great importance in the British monarchy.

The earliest published notice of Stonehenge occurs in the writings of Nennius, who lived in the ninth century. He narrates the particulars of the murder of four hundred and sixty British nobles at a conference between King Vortigern and the Romans, in the latter part of the fifth or of the fifth century, at or near the spot on which Stonehenge is situated; and attributes the erection of the monument to the surviving Britons, who thus endeavoured to perpetuate the memory of that tragical event.

The "British Triads of the Welsh Bards" refer its origin to the same cause, and relate that it was constructed by Merlin, after the death of King Vortigern. This likewise is the account of Walter Mapes [Geoffrey of Monmouth], who was very circumstantial in his narrative.

Geoffrey of Monmouth, who wrote in the twelfth century, gives a similar account of its origin, with the addition of a legend, which is repeated by most subsequent writers. He states that Merlin employed supernatural agency to remove the stones from Kildare in Ireland and place them upright on Salisbury Plain; and he adds that they had been in the first instance conveyed to Ireland from Africa. The same story appears in Gildas Cambrensis (1187), who mentions a similar monument which he had seen on the plains of King Arthur.

Henry of Huntingdon, who also wrote in the twelfth century, discredited the story of Merlin; and says that no one can devise by what means or for what purpose such a work could have been raised. Beowulf, William of Malmsbury, Hoveden, Ingluhsal, Matthew Paris, nor Florence of Worcester, have any notice of this remarkable monument; a circumstance which Henry of Huntingdon attributes to their inability to give any account of its origin or use.

Polydore Virgil (1534) says that it was raised by the Britons to the memory of Aurelius Ambrosius. Camden, who wrote in 1586, gives no opinion on its origin or purpose. His description and representation are so very erroneous, that it is doubtful if he ever visited the place. John Aubrey, in a manuscript referred to by Bishop Gibson, and Sir Richard Hoare, attribute its origin to the Britons prior to the Roman invasion.

It is a fact of much information which our old writers contain about this curious monument of ancient times. Modern writers on Stonehenge, rejecting all historical evidence, have raised their theories on purely speculative foundations. Inigo Jones, in his essay on Stonehenge, undertook at the death of King James I, and which was published in one small folio volume, by his son-in-law John Webb, a.d. 1655, endeavours to show that Stonehenge was a temple of the Romans, of the Tuscan order, dedicated to Ceres; but he has left many probable errors and false deductions, in nothing of the absurdity of his general assertion. The next essay was written about 1660, and published anonymously, in Langtott's 'Chronicles,' called 'A Fool's Bolt soon shot at Stonehenge.' The writer considers it to have been a British temple consecrated by victory over the Saxons, of the county of Somersetshire, over King Divisivis and his Belg. In 1663 Dr. Charleton published his 'Reflections on Stonehenge,' in which he contends that it was erected by the Danes, in the time of King Alfred, as a place for the crowning of his kings. Charleton's 'Reflections' called forth an essay of 228 folio pages, in support of Inigo Jones, by his editor John Webb, published in 1664; this essay is of a similar kind to those of Inigo Jones, and his remarks, 'Why may not the stones (alluding to the title "Chorea Gigantum" given to this monument) be the Phineans; and the art of erecting these stones, instead of those stones themselves, brought from the furthermost parts of the earth?' Edward 1675 appeared a volume of "Anti-Charmes," with a remark, 'Why may not these stones (alluding to the title "Chorea Gigantum" given to this monument) be the Phineans; and the art of erecting these stones, instead of those stones themselves, brought from the furthermost parts of the earth?' Edward 1675 appeared a volume of "Anti-Charmes," with a remark, 'Why may not these stones (alluding to the title "Chorea Gigantum" given to this monument) be the Phineans; and the art of erecting these stones, instead of those stones themselves, brought from the furthermost parts of the earth?'

In 1740 Dr. Stukeley published a folio volume, entitled 'Stonehenge, a Temple restored to the British Druids;' his attributes the work to the British Druids. The plates which accompanied this folio volume, are good; and Stukeley's restorations are valuable; but a large portion of his essay is occupied with fanciful and irrelevant speculation.

J. Wood, an architect of Bath, published a series of elaborate plans of this structure, in 1747. It is obvious that it was a temple of Druids, and was about 100 years before the Christian era.

The Rev. W. Cooke, in a treatise entitled 'An Enquiry into the Plantarchal and Druidical Religion, Temples, &c. 1755, supposes Stonehenge to have been held sacred by the Druids, and appropriated to the meetings of great assemblies, on civil as well as religious occasions; for which, he adds, "the world does not afford a nobler spot." Dr. Smith's work on Stonehenge, called 'Choir Gauis 1771,' gives a minute description of the structure, with the most of the theories of earlier writers. He considers it to have been of Druidical origin, and that it was a 'great orary,' erected as well for the purposes of astronomical observation as for religious ceremonies.

Mr. Davies, the learned author of 'Celtic Researches 1804, and the Mythology of the Druids, 1809,' has discussed the question respecting the origin and use of Stonehenge perhaps with more research than any previous writer. He supposes that this structure and Silbury Hill are two of the three works alluded to in a Welsh Triad as constituting the greatest labours of the island of Britain; i.e., 'lift the stone of Kettis,' 'building the work of Emrys,' and 'piling the Mount of the Assemblies.' That Stonehenge was a national structure, then, is certain; and that it is an altar, one of the Druidical marks, 'is evident, from the language in which it was described, and the great veneration in which it was held, by the primitive bards, those immediate descendants an arrowed disciples of the British Druids. It was not celled Silbury Hill, to the Sun, the Moon, or Saturn, or any other individual object of superstition; but it was a kind of Pantheon, in which all the Arkite and Sabean divinities of British theology were supposed to have been present.' A Druidical monument, dedicated to Apollo, was discovered in the temple of the Druids in the days of Hengist; and that its peculiar sanctity influenced the selection of the spot for the place of conference between the British and Saxon princes. Mr. Davies further cites a passage in Diodorus Siculus, which mentions that the temple of Apollo at the Pantheon was dedicated to Apollo, which he concludes to have been more likely Stonehenge. (Diod. ii. 47.) Sir R. Hoare has entered more fully into this passage ('Antiquiti Wiltshire,' i. 155.)
The Rev. Jas. Ingram, in his "Inaugural Lecture on the Utility of the Saxon Literature" (1868), considers Stonehouse, with its curious oblong barrows, to be a hollow ceremonial plaza, the smaller barrows being the remains of the ancient rites and ceremonies, and the larger and much higher ones the burial-places, and the clys adjoining as the hippodromes, or the seats of the gods of the deceased, were run for at the time of the burial.

This opinion is entited to some consideration, from the vast number of barrows and other earth-works which abound in the neighborhood. The late Mr. Cunningham, in Sir R. C. Hoare's History of Antient Wiltshire, folio, 1812, observing the difference in quality and size between the stones of the exterior and interior circles, supposes that Stonehenge was erected at different periods. The stones of the exterior circle, and those of the small stone circle, were raised far later than the smaller circle of the central or old temple.

In conclusion, it may be observed that there appears much less reason for ascribing the erection of Stonehenge to any of the successive conquerors or colonists of Britain, than to its original inhabitants the Celtic Britons; and if this be admitted, it is a probable conjecture that the structure was erected, for religious purposes under the direction of the Druids. The practice of commemorating an important event by raising a number of stones, is of the greatest antiquity, and there is nothing in the history either of the Druids or the Celts to lead us to believe that their supposition is not founded on some substraction of the like kind.

Stonehenge, a township and parish in the county of Devon, 217 miles west by south from London, and about midway between the large towns of Plymouth and Devonport. 

Apart from local distinctions Stonehouse would be considered as a component part of the one great town which was between 700 and 800. The establishment of the hospital of St. John the Baptist, in 1216, of the hospital of St. Thomas, in 1234, and of the hospital of St. Mary Magdalene, in 1342, would be considerable. But when the Reform Act was drawn up, it was deemed proper to associate Stonehouse with Devonport in the exercise of the elective franchise, which neither had previously enjoyed.

Stonehouse was a township and parish, and the former was divided into two wards. It is under the jurisdiction of a bench of county magistrates, who sit every Tuesday at the so-called town-hall, which is only a part of the watchhouse, which is used for the confinement of offenders until they are removed by order of the magistrates.

Stonehouse was originally called Hippenstone, the name of a mansion first inhabited by Joel de Stonehouse, in the reign of Edward III. The original, or West Stonehouse, of which the other or East Stonehouse, under Mount Edgcumbe, to the noble proprietor of which this, usually distinguished as East Stonehouse, also belongs.

For several centuries Stonehouse was a fishing village, with a small chapel. During the civil wars its population was between 700 and 800. The establishment of the Royal Naval Hospital in 1762, and of an extensive depot for the Royal Marines in 1784, gave a great impulse to the prosperity of the place, which has, within the present century, been greatly strengthened by the late earl of Mount Edgcumbe's liberality, by the establishment of the hospital, and by the town rapidly to increase. The recent removal of the Royal Victualling Establishment from Plymouth to the extremity (Cremyll Point) of the peninsula on which Stonehouse is situated, will increase its prosperity.

The streets of Stonehouse are much wider than those of other towns in the same county, and are more regularly laid out than we usually see in a town of its class. The houses are very neat, but small, except in two or three streets, which the gentry inhabit. There is no public building of any note, except those pertaining to the port of Plymouth, which have been already named. The parochial chapel of St. George, which has 1000 sittings, was built in 1789, and is a perpetual curacy, in the gift of the vicar of St. Andrews, Plymouth. The new chapel of St. Paul's, which has 950 sittings, was opened in 1854, and this minister is appointed by the incumbent of the parish. There is another episcopal chapel in the Royal Hospital. The Methodists, Calvinists, Independents, Baptists, and Roman Catholics, have their several places of worship, with sittings altogether for 3503 persons.

The parish has for its schools a national school for boys and girls, with 378 pupils; a national school with 188 boys and girls, and an infant school with 113 boys and girls. The Sunday schools are five, one belonging to the church, and the rest to the several denominations, with 722 children. Stonehouse has a Micawberian charity school for boys, and an almshouse for eight poor widows has been lately established by Mrs. Bint. The workhouse is a plain structure, erected in 1801. There is a small library and a reading-room, connected with the Naval Grammar School, used by the naval service. The market-place is a neat and convenient building. There are two annual fairs, one held in May, the other in September. The population of Stonehouse was 3407 in 1801, 6043 in 1811, and 7194 in 1821.
STONFIELD FOSSILS. The accumulation of organic remains in the thin slaty limestones of Stonfield is one of the most remarkable phenomena known regarding the distribution of fossil remains in the rocks. Coniferous, cycadaceous, and filicoid plants; lamelliferous corals, conchils, gastropleps, cephalopods, crustaceans, insects, ganoid fishes, terrestrial and aerial saurians, marsupial mammals; all these occur together, and suggest to the naturalist a variety of inferences and speculations. In general, the sediments, the sandy beds of Stonfield appear to be deposits produced in the sea near the shore in shallow water, at points to which fresh-water currents might send, at intervals, some of the spoils of the land. The marine conchils are often found with valves united, and otherwise in conditions which indicate residence on or near the spot where they are buried; but the broken state of the land plants, the scattered elytra of insects, the detached state of the teeth and bones of the mammals, and mammalian scolopendra; all these afford a marked contrast from some distance. A great distance cannot well be supposed, for in that case we must imagine the course of a great river, and look for its effects over much wider areas than that of the Stonfield fossils. These, and the general character of the deposits, and signs of the same, of the same or nearly the same geological date, in the oolitic series of Northamptonshire and Yorkshire, but they seem to be due to separate areas of littoral agitation.

Admitting then the original habitat of the Stonfield fossil beds to be identical with the present limestone, the present limestone, we may venture to ask, to what local fauna and flora in any of the natural regions of the existing land and sea does the Stonfield series of life offer the greatest analogy? Professor Phillips (Treatise on Geology, 1837, vol. i., p. 165), in his treatise of the oolite, among the present local, groups, observes that "it is impossible to turn to Australia without a suspicion that the abnormal productions of that region have more than the average resemblance to the primary fauna and flora. For ham ovum, cycadum, areciaaria, casuarina, grow upon the land; corals and sponges abound on the coast even of Van Diemen's Land; while trigonise, cerinthium, isoaestichus, ear dislike C. billianum of the green sand, and quadrupeds of the peculiar marsupial races to which the Stonfield animal is referred by Cuvier seem, to invite attention to the yet unexplored sea and land of this prolific region, as likely to yield still further analogies to antient animals and plants, and by consequence to furnish new and important grounds for determining the antient physical conditions of the globe." A similar view of the determinate analogy of the races of animals and plants now living in Australia, and long since buried in the oolite strata, has presented itself to Professor Owen, whose decision of the marsupial and mammiferous character of the lower jaws of quadrupeds found at Stonfield is a gratifying confirmation of the opinions of Cuvier and Buckland, and one of the most important data for the paleontologist. (Report to the Brit. Assoc., 1841.)

There is yet no complete catalogue published of the very numerous species of fossils found at Stonfield, and preserved in the collections of Buckland and other geologists. Many of the plants are noticed by Sternberg, Brongniart, and others; Mr. Sowerby has figured many of the shells; the work of Agassiz may be consulted for the fishes; Dr. Buckland's Bridgewater Treatise, and Professor Owen's Report, already alluded to, and other works of the same author, for the reptiles and mammalian remains.

STONHOUSE, SIR JAMES, who was originally a physician, afterwards a clergyman, and who became a baronet late in life, on the death of a distant relation, was born July 23, 1716, at Trench, near Abingdon. His father was a counsellor of the Court of Wrenchester School, and after he took his seat of M.B. in 1742, and that of dentist for much of his medical practice, he settled in Lincoln's Inn Fields. He sat for two years under Sir Ed- dard, Dr. Letherland, and carried on his medical studies for two years more at Paris, Lyoo Montpellier, and Marseille. On his return he settled at Coventry, where he married the eldest daughter of John Neale, Esq., member of parliament for that city. This lady, who died in 1747, soon after their marriage, in the twenty-fifth year of her age, is introduced as one of the examples of frail mortality in Harvey's 'Meditations, and is further commemorated there in a note. In 1743 Dr. Stonhouse resided at the Queen's College, Oxford, where his practice became very extensive. He was in all respects a great benefactor to the poor, and, among other schemes for their relief, founded the County Infirmary. During his residence at Northampton the celebrated Dr. Akenside in vain attempted to get a foot in the door, and made of him in Life of Akenside, 'practised with such reputation an success, that a stranger was not likely to gain ground upon him.' After twenty years' practice in Northampton, D. Stonhouse quitted his profession, assigning as his reason that his practice was too great for his health; he neither the natural activity of his mind nor his unceasing wish to do good would permit him to remain unemployable. As he was particularly fond of the study of divinity, he was invited in 1747 to the presbytery, and, if the special favour of the bishop of Hereford, in Hereford cathedral, and priest the week after, by letters dismission to the bishop of Bristol, in Bristol cathedral. In May, 1764, he was presented to the living of Little Cheverel, and in Dr. of humanity, beneficence, and charity, he not only devoted himself to the duties of his station with fervour and assiduity, and became very popular as a preacher. About 170 years before this, he had married his second wife, D. Stonhouse's party, for which he was most admired, had no rival. He quitted Oxford University when he published his own reflections on the nature of the University; and when they were submitted to him, he declined, in a letter to Dr. Nicholls, that he was for seven years a confirmed infidel, and did all he could to subvert Christianity. He went so far as to write a keen pamphlet against it; the third edition of which he burnt. He adds, 'I fear the University in future may have so deeply repented of it, God has forgiven me, though I never can forgive myself.' His conversion to Christianity (which he attributes to some of Dr. Doddridge's writings), and his charity and benevolence, were such that he was persuaded to write the history of the University, for publication after his death, but, in consequence of the suggestion of a friend, and his own suspicions lest a book might be made of it, he was induced to destroy it. He died at Brust Wells, Dec. 8, 1765, in the eighty-fourth year of his age. Among other ways of doing good, S. James Stonhouse was convinced that the dispersion of plain and familiar tracts on important subjects was one of the most important and he accordingly wrote several of these, some of which have been admitted by Promoting Christian Knowledge. Much of his general character and conduct, his sentiments, and the vicissitudes of his professional employment may be learned from his correspondence, published in 1822, vol. 12mo., with the title, 'Letters from the Rev. J. Chorley and the Rev. Sir James Stonhouse, with an account of the Stonhoun's, 'LXXI.' and Chalmers, Dict., Stony Stratford, Buckingh. Strateford stoppage in a case is the seizure by the stoppage of the goods sold during the course of their passage to the buyer.

In explaining the nature of the right of stoppage in transitu, it is necessary to consider:

1. Under what circumstances it exists.
2. By whom and how it may be exercised.
3. How it may be lost.
4. What is the effect of it.

When goods are on credit without any agreement a time of delivery, the right to the possession of them, as well as the property in them, vests immediately in the buyer. Originally it would appear that the right to the possession and the ownership were considered absolute, the consequence of which, in case of the buyer's insolvency immediately after the sale, was, that the goods, although unpaid for, and still in the possession of the seller, formed part of the insolvent buyer's estate, and were liable to distribution among his creditors. This was opposed by the merchant law of other nations, and was condemned as inequitable, and, accordingly, about the year 1690, the Court of Chancery first introduced the doctrine of stoppage in transitu.
transitu. (Wiseman v. Vanudep, 2 Vern., 203; Snoe v. Prescott, 1 Atk., 245.) It has been since universally recognized in the courts of common law. By virtue of this doctrine the seller was held entitled to insist upon the goods at any time before they came into the buyer’s possession.

During such time they are said to be in transitu, by which, as Lord Mansfield says, is meant every sort of passage to the lien or mortgage. The buyer that is intended to have them assigned to him in transitu is not the place agreed upon between the buyer and the seller as the place of their ultimate destination. This is not necessarily the actual premises of the buyer; it may be any place, as, for instance, a seaport, the warehouse of the carrier, or the bill of lading. If the buyer, for the purpose of defeating the consignor’s right of stoppage, still remains. However, the buyer may be in transitu, and with respect to goods so circumstances, questions very frequently arise as to whether the right of stoppage in transitu still exists or not.

When these questions are not determinable by the express terms of the contract, it may become a matter for inquiring whether any other act remains to be done on the part of the seller previous to the actual delivery. If not, it is to be presumed that the transitus is at an end. The buyer’s right to possess may be rendered absolute by the seller giving a bill of lading, thus conveying to the bill of lading the place of the warehouse where the goods lie, the delivery of the goods being the exercise of acts of ownership upon them by the seller, with permission of the buyer. [Salk.] After the transitus of the goods has come to an end, the case of the customer is different from that of the consignor, as the delivery of the goods may have been made to a third party, at his request, as a part of his usual business; and it may be presumed that it could not be anticipated by the seller in meeting the goods and taking possession of them while on their route. The law now, however, appears to be, that if an actual delivery has taken place, even though by means of a bill of lading, or any other act on the part of the seller, the position of the goods may, for the purpose of the buyer being in transitu, be ascertained, the person in possession of the goods is in the case of a third party in transitu as regarded the goods at the time of the disposition of the goods.

When the transitus has once been entirely accomplished, the right of stoppage in transitu is extinguished, and cannot again be revived.

The right of stoppage in transitu may be exercised, allowing only the price of the goods to be paid by the buyer, but not by the seller to whom the balance is in favour of the buyer. A seller is justified in refusing to part with his goods under such circumstances, or in refusing to stop them in transitu after the transitus has commenced.

2. The seller, or some one acting on his behalf, is the only person who can exercise the right of stoppage in transitu. No other person, however much interested, possesses the right to stop the goods upon the ground of the price of the goods, or one who has a lien upon them before he parted with the possession of them, has no right to stop them in transitu. A party however who bought goods for a correspondent from third parties, who were unknown to his correspondent, and charged him a commission upon the price, was held to be, as regarded the correspondent, in the light of an actual seller, and therefore entitled to stop the goods in transitu.

The buyer of goods cannot act as the agent of the seller for the purpose of exorbitant goods in transitu. No act of his, such as placing the goods in the hands of third parties, &c., will operate as a stoppage in transitu.

In order to effect a stoppage in transitu, it is not necessary that corporal possession of the goods should be obtained, but the buyer need not surrender them to the buyer, to a carrier not to deliver them, &c., is a valid exercise of the right.

3. The right of stoppage in transitu being a right of the seller against the buyer, it is not exercisable by the seller against a third party, and must be obtained through the buyer only, can defeat it. Such parties stand in the same condition towards the sell-
spere's Comedy of Errors. Portions of the music he afterwards used in his Pirates, and in No Song, no Supper.

In March, 1787, Storace and his sister returned to England, and were immediately engaged at the King's Theatre, the lady as first soprano, and her brother as director of the music. Her success was most decided, but the intrigues of the Italian performers were too harassing for his sensitive nature, and he withdrew in disgust to Bath, devoting his time to drawing, an art for which he had much talent. In 1791 he first opened at Drury Lane in The Haunted Tower, his sister appearing in the principal character, and this was performed no less than fifty times during the season. In 1790 he brought out No Song, no Supper, written by Prince Hoare. In 1791 the Storaces were engaged by C. P. E. Bach, and much of Martin's music is mixed up with Storace's. The Pirates was given for the first time, in November, 1792; the performers were Kelly, Dignum, Sedgwick, Suett, John Bannister, Parsons, Mrs. Crouch, Miss De Camp (afterwards Mrs. C. Kemble), Mrs. Bland, and Signora Storace. The picturesque scenery was from designs made at Naples, by the composer himself. The Prize was brought out in 1793; Lodzanski, translated from the French by a music student selected from the rival operas of the same name by Kreutzer and Cherubini, with additions by Storace, in 1794; and the same year also produced The Iron Chest, by George Colman, the younger, the incidental music by Storace. The composer's attendance on the first night was not forgot, while the influence of a severe attack of gout and fever, cost him his life. He returned from the theatre to his bed, and never rose again, dying on the 19th of March, in the thirty-third year of his age. Mr. Colman, in his preface to this play, describing the composer as a man of science and a music lover, gives enumerations an event which deprived the world of a genius, and himself of a most intimate and valued friend; and adds, 'may, even the composer of the music—and here let me express myself in the memory of a departed worthy genius, as I write the name of Storace—even he could not preside in his department. He was preparing an early flight to that abode of harmony where chairs of angels swell the note of welcome to an honest and congenial spirit.'

At the time of his death he had a new opera, Mahmoud, in preparation. He had been to Bath to hear Braham, who then had not made his appearance on the London stage, and engaged him for Drury Lane. This however, by the assistance of Signora Storace and friends, was completed and performed for the benefit of the widow and child of the composer, on the 30th of the month in which he breathed his last, and, supported by John Kemble's admirable acting, and Braham's not less admirable singing, was most successful.

Our space will not allow us to particularise the other works of this highly-gifted amiable man; but it is only just to say of those here enumerated, that they 'abound in spirit, taste, science effectively but not pedantically displayed, strong feeling, and good sense;' and to add, that their author, in these as in other matters, evinced a vigorous and cultivated mind. 'His opinion on literary subjects was much respected by the best critics, and he was often consulted on points connected with his professional pursuits.' (Harmonicon, vol. vi.)

STORAX. [STYXAX.]

STORCK. [STORCK.]

STORK. [HERONS, vol. xii, p. 163.]

STORM, EDWARD, a Danish poet of some note, was the son of a clergyman at Guldborgsund in Norway. When he was a child, he wrote some verses which his literary contemporary Thomas Thaarup, whose mother is said to have dreamt that a rival to her own child would be born about the same time at Guldborgsund. Storm began his literary career at the age of twenty-five with a short heroic comic poem in six cantos, entitled 'Brøger.' Being written in hexameters, it recommended itself at the time as a novelty, nor is it without merit in regard to that minute descriptive painting of familiar objects which is so much admired in the circle of contemporary eugènies. The second edition of it was published. His 'Infodretlen,' a poem in four cantos, of the didactic class, and one or two other productions of a similar kind, have many fine passages and poetical beauties; his reputation however was not immeasurably increased by them. He translated Shakespeare into Danish for him a place in Danish literature by the side of Thaarup. Storm was for some time manager of the theatre at Copenhagen, which post he held at the time of his death in 1794.

STORNAWAY. [ROSS AND CROMARTY.]

STOTHARD, THOMAS, an eminent painter, the son of a publican who kept the 'Black Horse' in Long-acre, was born there on the 17th of August, 1755. At a very early age he commenced his studies for drawing, and was employed as an assistant in one of the best engraving shops in the Strand. At last year of his apprenticeship was given to him in consequence of the decline of the trade. During the period of his service, Mr. Stothard exercised himself diligently in the study of nature from flowers and other subjects of still-life. His first drawing was his 'branch of the' 'Orchard and Country Magazine,' published by Harrison, in Pater-noster-row; and soon after he gained high repute by his admirable compositions for Bell's 'British Poets, and the Novelist's Magazine,' works which caused him to be employed in the illustration of almost every publication which has been issued for many years issued from the press in England requiring pictorial ornament. During this period he diligently studied at the Royal Academy. The first picture that he exhibited at that institution was the subject of Ajax defying the body of Patroclus. In the year 1785 he was elected an associate of the Royal Academy, and advanced to the rank of Royal Academician in 1794. In 1810 he was appointed deputy librarian to Mr. Birch, and on the death of that gentleman in 1817, the office was held by Mr. Stothard. More important of his works may be enumerated his designs for Boydell's Shakspeare, his Canterbury Pilgrims, the Fitch of Bacon, and the Wellington Shield, of the last of which he made an etching. His largest performance is the fresco in the main room of the University of Edinburgh, to which he is indebted for the sum of £1,600. This work was executed in 1792, and is one of the most exquisite of its class. Exeter. He also designed the ceiling of the Advocates' Library at Edinburgh. The first style of painting adopted by Mr. Stothard was that of Mortimer, whose chief works are of a more minute and elegant character. The style of painting is closelyimitated, indeed so exactly that many of his early works are mistaken for those of that vigorous painter. In his later productions however he adhered to the best of his own genius, which was essentially gentle. He is supposed to have made upwards of five thousand designs, three thousand of which have been engraved, and although, as might be expected in so large a number, there is a sameness and mannerism of style, yet
ruth, nature, simplicity, and grace are always apparent. In his comic subjects he was very happy, without in any instance descending to vulgarity, whilst in his representa-
tions of female beauty his drawing is replete with purity of design and delicacy of execution. For several months before his decease, though Mr. Stothard's bodily ailments prevented his attending to his labours as an artist, he would not relinquish his attendance at the meetings and lectures at the Royal Academy and in the library, not withstanding extreme deafness prevented his hearing the drawings from the press, 1824, at his house in Newman Street, where he had resided more than forty years, and was buried in Bunhill-Fields burial-ground.

To have a numerous family, the most eminent of whom was the Rev. Mr. Stothard, a work of art. A great number of his works have been engraved by Collins, Heath, Parker, Cromek, and Medland, and there are several engraved portraits of him, the principal of which are by Worthington, after Harlowe, and Banda, after Jackson. (Annual Biography and Obituary; Gentleman's Magazine.)

STOTHARD, CHARLES ALFRED, an antiquarian raughtman, a son of Thomas Stothard, Royal Academician, from the paintings of which he was admitted as a student of the Royal Academy, where he was soon distinguished for the chasteness and elegance of his copies from antique sculpture. In the following year he became a student in the Loan Academy, and was attached to the British Institution, Pall Mall, to study from the pictures by the old masters. In 1810 he executed his first historical picture, 'The Death of Richard II, in Pomfret Castle,' in which the costume of the period was accurate, and the knowledge of costume and the figures, as well as the landscape, was the creation of his own imagination. His undertakings were, to give the historical painter a complete knowledge of the costume adopted in England from an early period of history to the reign of Henry VIII., to illustrate history and biography, and to assist the stage in selecting their characters. For these purposes he projected the series of Shakespearian subjects, which were the successful result of this undertaking, and which, taken as a whole, is considered amongst the best contributions to the subject in the last century. The success of the work was complete, and at once established the reputation of the author both as an antiquarian and an artist. In successive years he occupied himself in making excursions in search of monuments. In 1818 he proceeded so far northward as the Piets Wait to make drawings for Lysons' 'Magna Britannia.' In the same year he was appointed historical draughtsman to the Society of Anti-

quaries, and in 1816 was elected by that body to make drawings from the tapestries at Bayeux. He left England for that purpose in September, and after having visited Paris, proceeded to Chino, and discovered in the adjacent abbey of Fontevraud those interesting works the existence of which was only known, it is supposed, to a very few persons. At Fontevraud, after examining the effigies of the monks, he doubtless, the monuments of Henry II., his queen Eleanor of Guinnee, Richard I., and Isabella of Angou-

Stow, John, was born in London, about the year 1525. His father Thomas Stow belonged to the company of Merchant Tailors, and both his father and his grand-

father appear to have been tradesmen of credit and sub-
bstance. Both had monuments in the church of St. Michael's, Cornhill, in which parish they dwelt, and which has proba-

bly also the honour of having given birth to the subject of the present article.

It is certain that Stow, in the earlier part of his life, followed some trade, for it is expressly called a tailor in at least one document of the time. It appears that in his own day he was regarded as secretly attached to the old religion, and he was more than once exposed to some danger on that account; he was certainly never no believer in the act of his profession, for without doubt he was an antiquarian rather than a theological feeling; he did not sympathize with the destructive work of the Reformation; but he does not deny that both doctrine and practice were purer under the new system than under the old. It is not true that his friends were some of the heads of the Established Church, to which also there can be no doubt that he always professed to belong.

He had probably been given from early life to the inves-
tigation of the national antiquities; but about his fortieth year, as we learn from himself, he left his business and ap-
pplied himself altogether to this his favourite study. The
II. The account given by the writer of the article "Slow in the 'Biographia Britannica' is, that his 'Summa..."
full length on the title-page, and is dedicated to the Right Honourable Sir Richard Stanton, Knt., lord-mayor of London, a hand-written letter, and among the expunged effects of the Merchant Tailors, and all the commons of the same city. In the dedication he speaks of the former editions of his 'Summary,' and also his 'late published Chronicle and Antiquities,' and in the letter, the title-page of the latter, there is a large copy of this larger Chronicle; but we believe these various expressions refer only to one other work besides the 'Summary.' The next edition of the 'Summary' that we have met with is entitled 'The Abridgment of the English Chronology, first printed by M. the author for himself, with very memorable antiquities, and continued with matters forconce and domestical, unto the end of the year 1610, by E. H., gentleman; imprinted at London for the Company of Stationers, 1611.' This volume is a 12mo, in black letter. It seems to have been a labourious work, but it does not appear to be an original edition of the 'Summary,' and does not seem to contain, with the exception of the Continuation, much more than what Stow had already printed, although Howes, the editor, tells us that, besides the time the present edition had cost him, he had laboured five years on a preceding edition of the work, which appears to have been published in 1607. The present volume has two dedications, one to Sir Henry Rowe, who was lord mayor in 1607, the other to Sir William Craven, who was elected to that office in 1611. It was issued at a time when the constant demand for a half century after its first publication; it was the popular manual of our national history; hence the book was laid hold of by the Stationers' Company, who probably brought out new impressions of it every thing from 1611 to 1630, and other publishing houses like their almanacs and other similar handbooks.

2. Of the 'Annals,' a copy now before us in 4to. and black letter wants the title-page, but appears to have been printed in 1594, to which year the history is brought down. At the end of M. the printer, 'A work of great sort, and a labourious undertaking,' the printer's note: 'so shalt thou encourage me to publish a larger volume and history of this island, princes of the same, and accidents of their times, which have gathered, and is ready to the press, where God shall permit me.' Stow's 'Annals,' although of course they operated, to some extent, as the same facts, with many others, as his 'Summary,' is altogether a different work from that: even this edition of 1594 must contain at least ten times as much matter as the most extended edition of Stow's 'Chronicle,' and black letter, a copy of which is in the British Museum, is entitled 'The Annals of England; faithfully collected out of the most authenticall authors, records, and other monuments of antiquity; lately collected, since encreased, and the text of manuscript historie, to the end of the year 1605; by John Stow, Citizen of London. Imprinted at London for George Bishop and Thomas Adams. Cum privilegio regii majestatis.' This edition has the dedication to Whitgift, dated 1600, already mentioned, and also a 'Preface or Address to the Reader,' which contains the greater part of the Dedication prefixed to the various editions of the 'Summary,' and inscribed to the lord mayor for the time being. In his Dedication to Whitgift the author states that his labours and collections have now at length grown into a large volume, 'which,' he says, 'I was willing to have committed to the press, had not the printer, for some private respects, been more desirous to publish Annals at this present; and he afterwards expresses his hope of the arrangement of the whole of the present portion, but part of that which he 'intended in a more large volume.' In his Preface also he describes this edition of his 'Annals' as an abstract of a far larger work which he has gathered, and meant to have published; and at the end of the 'Chronicle and Antiquities' of 1598, he adds: 'So shalt thou encourage me, if God permit me life, to publish or to leave to posterity a far larger volume, long since by me laboured, at the request and commandment of the Reverend Mr. Parker, Archbishop of Canterbury; but, in that case, my book was prevented by printing and reprinting (without warrant or well-liking) of Rayner Wolfe's 'Collection, and other late comers, by the name of Raphael Holingshead his Chronicles.' We doubt if, with the exception of the continuation, there be almost anything in the edition of the 'Annals' which is not in the preceding edition of 1592. This was done in 1605, and the work, referring to the portion of which Stow is the author in either of the editions published after his death by Howes, in folio, the first in 1613, the second in 1631. Of the latter, still in its title-page is 'A Supplemental or General Chronicle of England; begun by John Stow, and augmented with matters forconce and domestical, antient and modern, unto the end of this present year 1631, by Edmund Howes.' In his dedication to the king however Howes intimates that the work comprised thirty years, and that he himself took to the work, and that he had undertaken and performed the task in consequence of his 'oath and promise made to the most reverend prelato Doctor Whitgift, Lord Archbishop of Canterbury.' We do not find that he professes to have made use of the manuscript materials of this edition.

Stow's other work, his 'Survey of London,' was first published, in a quarto volume, in 1598; and again, in the same form, with considerable additions, in 1603. After the author's death, a third edition, also in 4to., was published in 1618, by A. M. (Anthony Munday), who, according to Strype, 'made several additions' (as he pretended) which, or much of which (as he hinted in his Epistle), he had formerly from Stow himself, who, while he was alive, delivered to him, and some of his manuscripts, and making great persuasions with him to correct what he found erroneous, and proceed in perfecting a work so worthy.' A fourth edition, in folio, came out in 1633, professing on the title-page to be 'now completely finished by the study and labour of A. M. (Humphrey Moseley) and others.' It was perhaps as one of the contributors, meaning probably the C.I. whose signature is appended to the prefatory address to the reader. The next edition was that published by Strype, in 1720, in two folio volumes, each twice the size of the folio in 1603, and this indeed must not have been the greater part, a new work. The writer of the article on Stow in the 'Biographia Britannica' is, as far as we know, mistaken in his assertion (Note L.), that this edition was reprinted in 1756.

Stow, in various passages of his 'Annals,' claims the continuation of Holinshed's 'Chronicle' from 1576 to 1586, as his own handiwork. He appears to have at least supplied a great part of the materials for that portion of the work; but he is merely mentioned as one of several contributors in the Epitome to the Reader printed at the beginning of 1587 by A. F. (Abraham Fleming), who besides takes to himself the credit of having digested the whole. In his 'Annals,' under the year 1400, Stow states that the first edition (by Strype) is founded 'upon divers written copies corrected by him.' Dr. David Powel, in his 'History of Cambria,' published in 1584, acknowledges that he derived important assistance from Stow, who supplied him with a considerable number of manuscripts; and we may probably add that, on account of his own possession of a large collection of curious and valuable manuscripts, some originals, some transcribed by his own hand; among the latter, the six volumes of Leeland's 'Collectanea' (since printed by Hearne), which he sold to Camden for a life annuity of eight pounds a year.

The hard fate of Stow in his old age is well known. The laborious and acute investigator of antiquity, and faithful and graphic depicter of the manners and customs of his own time, was left by his countrymen, when he had received his eightieth year, literally to beg his bread. Strype has given a letter from James I, referring to letters patented under the great seal, granted 8th May, 1603, authorizing Stow to collect the voluntary contributions of the people for the establishment of the king's printing-office, and also the actual brief or licence by which the same privilege was re-newed to him the following year. The latter paper, in consideration of Stow having, 'for the good of the commonwealth, and posterity come, and continue to the history of chronicle all such things worthy of remembrance, as from time to time hap-pened within this whole realm, for the space of five and forty years, until Christmas last past' (as divers large and brief chronicles of his writing may appear), besides his
great pains and charge in making his book called his "Survey of London," wherein he spent eight years in searching out of ancient records concerning antiquities both for London and Southwark, and in consequence of his having solicited the favour, and having left his former means, whereby he lived, only employing himself for charity and good of his country, grants to him and his deputy, the bearer of the paper, licence for one year, to ask, gather, and receive the same and charitable benevolence of all people in the counties and cities enumerated, and command the same to be paid him such times as St. Andrew's day his deputy shall come to any of their churches, or other places, to ask and receive the said gratuities, 'quietly to permit and suffer them so to do, without any manner let or contradiction.' Stow died of the dropsy, on the 10th of April, 1605, and was buried in his parish church of St. Andrew Undershaft, where his monument, exhibiting his effigy, erected by his widow, is still to be seen. Strype says that he left four daughters, but whether any sons he could not learn.

It is stated by Mr. Corney, in his 'Curiosities of Literature Illustrated' (p. 41, note), that a memoir of Stow was then contemplated by John Gough Nichols, Esq., F.S.A.; but, as far as we are aware, it has not yet appeared.

STOW-ON-THE-WOLD. [GLOUCESTERSHIRE.]

STRAHAN. [CORNWALL.]

STRAWBURGH. [SUFFOLK.]

STRABO (Strabo) was born at Amasia, in Cappadocia, before the Christian era, but the time of his birth is unknown. His mother was the grand-daughter of Lagastes, who was a son of Dorylus, a skillful commander who had been employed by Mithridates Euergetes. (Strab., p. 477, 478, ed. Curtius.) Monophysites, who had been employed by Mithridates Eupator, was an uncle of Strabo's father. (According to the reading of Strabo's text) the uncle of his mother by the father's side. We are not informed how his father was. It has been observed that his name, Strabo, is the cognomen of Pompeius Strabo, the father of Pompey the Great, to whom he has been conjectured to have been related; but there was some connection with the family of Pompey; but what this connection may have been, is purely a matter of conjecture. Strabo, the son, received a good education. He studied at Nesea, under Aristarchus; at Amasia, in Pontus, under Tryphon; and at Seleucia of Cilicia, under Xenarchus, who was a Peripatetic. He also visited Alexandria in Egypt, where he had the instruction of Boethus of Sidon, also a Peripatetic; and Tarsum, then a great school of learning, where he studied under Athenostratus, who was a Stoic. It thus appears that even during the course of his education Strabo must have been a considerable traveeller, and his own work shows that he must subsequently have visited many places. Syria, Palestine, and Egypt, as far as ancient records go, were the countries of each of his travels. In Egypt he became acquainted with Julius Gallus, who commanded a Roman expedition into Arabia, in the time of Augustus, and he visited in his company the royal statute of Memnon at Thebes (p. 816). He also travelled in Crete, Northern Greece, and probably some parts of the Peloponnesus: he tells us that he saw Cleomen from the Aerocorinthus: but his remarks about Mysia seem to show that he did not visit that part of the Peloponnesus at least (p. 377). He was personally acquainted with Italy, and he tells us that Elba, Corsica, and Sardinia are visible from the heights of Populonum (p. 223), from which it is a probable conclusion that he had seen those places from the Italian coast. It is also probable that he spent some time at Rome, where he would find materials for his geographical work.

There are various passages in his 'Geography' which indicate about what time they were written. In his sixth book (p. 298) he speaks of Germanicus and Drusus as still living; of its being the thirty-fourth (p. 682) of Augustus as the reigning emperor, and as having repaired the mischief done to Sardinia by the great earthquake, A.D. 17. (Tacit., Ann., iii. 47.) There are numerous other passages in this and previous books which can with certainty be referred to a great earthquake. In a passage of the sixth book (p. 298) he says that it was then the thirty-fourth of Augustus as the reigning emperor, and that it had been reduced to obedience which had taken place, and that it was writing his fourth book in the

Strabo's 'Geography' is mentioned by few antient writers: he is cited by Marcus Plancus of Hierothes, Athenaeus and Harpoeractes (Aet. Alex., Aymon); but Pliny, who-might frequently have cited him in the geographical part of his work, never mentions his name; nor does it occur in Pausanias. He is mentioned by Diodorus and his general Polybius as a geographer, but as an historical writer.

Very different opinions have been given of Strabo's geographical work. That he was deficient in mathematic knowledge is admitted by many; but it is evident that his great learning in other parts of knowledge, cannot understand his work: 'work,' he says, 'is, in a word, for universal use, political, or profitable to all, just as history is' (p. 12, 13); and it has written an historical work (geographicae annalium, p. 135, ed. Curtius), both for ethical and political. He determined to add it to a geographical work, which was of a like kind, and addressed to the same class of men, in a chief to those in power; and, as in the former work, the author has added, both for ethical and political.

Accordingly Strabo produced a work which contains geographical work, and which, according to the notion of system, does not determine the name of a city of geography. Though he resided a long time at Alexandria, he derived little advantage from the labours of the geographers and astronomers of that school for the correct estimate of positions and fixing the bearings of places with respect to one another, or for determining the general form of regions which he describes. His taste indeed was for such studies as those which belong to the geographer.

The geographical method which he employs is called ethnography. In the first book he treats of the advantages of a study of geography, and discusses the geographical knowledge of Homer, which he rates highly. He then mentions the old geographers, as Hecataeus, Demetrius, Eudoxus of Cnidus, and Ephorus of Cumea; and the recent geographers, Eratosthenes, Hipparchus, Polybius and Posidonius. He passes a critical judgment on the fit two books of Eratosthenes, which leads him to various conclusions, and to observing that the changes which the earth's surface has undergone. In the second book he teacts his criticism to the third book of Eratosthenes, and the three books of Hipparchus. He also discusses the men of Posidonius and Polybius. Strabo has thus preserved many passages of the Greek geographers. The author's judgment is often prejudiced and inaccurate. He severely criticises Hipparchus, and points out many of the errors, particularly as to the latitude of places. The last part of the second book treats of the preliminary knowledge acquired from the observation of the spots of the earth with the fact of the spherical figure of the earth and determines the boundaries of the habitable part of it. The world is divided by the equinoctial circle into the northern and the southern, and the southern is bounded by the parallel bounded on the north by a parallel of latitude which passes through Ierne (Ireland), and on the south by the parallel which passes through the Campanian coast. The parallels are not the same as those which are made parallel are uninhabited owing to excessive heat. He task of Eratosthenes in his measurements, and compares the
with those of Hippiarchus and Polybius. The habitable world (\textit{mabieographe}) is surrounded by water, and the Caspian Sea is given a greater extent than he might have corrected by the aid of Herodotus. The length of the habitable world is about double its breadth.

The third book contains the description of the Spanish Peninsula and the Bosphoros Islands; its principal authorities are Artemidorus, Poseidonius, and Polybius. The fourth treats of Gallia, Britain, the Alps, and the tribes which inhabited the Alps, and the valleys belonging to that mountain-system: in general he follows the description of Caesar, and he also used Artemidorus and Polybius, and probably the celebrated works of Strabo.

The eleventh and twelfth books contain the description of Sicily, and-how are intended by that term: it has been suggested that the word has reference not to any particular individual, but to the results of the commission under the direction of Agrippa which made a survey of the empire: it has also been conjectured that Agrippa himself compiled the map from which Strabo drew his description of Sicily. Strabo treats of the countries on the Danube, and the parts included between the Danube, the Adriatic, and the Black Sea: the parts which treat of Macedonia and Thrace are lost, and in their place we have a scanty epitome. Strabo's authority is fourfold: the last two books of the sixteenth and seventeenth books are by Letronne. Strabo was translated into Italian by Ambrosoli, Milan, 1826, 4 vols. 8vo, and 4to. The valuable German translation of Groskurd, in 3 vols. 8vo. (1831-1834), is founded on a corrected text, and is accompanied with extensive notes and numerous authorities.

A full account of the editions, translations, and various works in illustration of Strabo is contained in Hoffmann's \textit{Lexicon Bibliographicum}.

\textbf{STRADA, or STRAUBIUS, JOHN,} was born in the year 1536, of an illustrious family, at Bruges, where he studied the art of painting. He went while very young to Italy, and soon acquired so much proficiency and reputation, as to obtain employment at Florence in the palace of the Della Rovere, Duke, Cosmo I. In 1567 he went to Florence he went to Rome, where he devoted himself with the greatest ardour to the study of the antique and the works of Raphael and Michael Angelo. By this means he so much improved his taste, knowledge of composition, and correctness of design, that he was rated among the most eminent artists of his time; and before he left Rome he was employed in the pope's palace, in conjunction with Daniel da Volterra and Francesco Salviati.

At Naples and other cities of Italy to which he was invited, he executed many considerable works in fresco and in oil; but he fixed his residence in Florence, in which city there are still some fine performances of his; the most celebrated is the Crucifixion, which is a grand composition, and with which life, and large numbers of persons near the cross are the Virgin, St. John, and Mary Magdalen.

Though he chiefly painted subjects from sacred history, he was fond of painting animals, hunting parties, and sometimes battles, all of which he executed in a noble style, and with great spirit. It is not possible to reconcile the statements of authors respecting the birth and death of Strada: Sandrart and others say he was born in 1536, and died in 1604, aged 68. This is probably correct. De Flies and Resta say he was born in 1587, and died in 1648, aged 77. The account of \textit{Storia dell'arte nella repubblica del Grand'Ufficio dei dipinti} says he died at the age of 82; yet they fix his birth in 1536, and his death in 1605, which would make him only 69 years of age.

(Philipington: Printed by Ryan.)

\textbf{STRAVA, FAMIA/NO,} born at Rome in 1572, entered the order of the Jesuits, and became professor of rhetoric in the Gregorian college at Rome, where he spent the greater part of his life, and where he died in 1649. He wrote \textit{Prolepses,} or \textit{La vita allegorica della vita humana.} These works were admired at the time. In these essays the author comments upon several of the Roman classical writers, and he introduces his own imitations of their style. He speaks very unfavourably of Tacitus, whom he accuses of malignity, impiety, and want of discretion, though he quotes with admiration. But the work for which Strada is remembered, is entitled \textit{De Bello Belgico ab Exceusus Caroli V. ad Annun 1590,} being a history of the revolt and war of the Netherlands against Spain, which he wrote in Latin, about the same time.
time as his contemporary Bentivoglio wrote the history of the same war in Italian. Strafford brought his narrative down to the year 1590, and the work was continued by two other Jesuits, fathers Donatti and Galluzzi, who wrote the sequel as far as the year 1609: their compositions however are very inferior to Strafford's in style. It appears that Strafford undertook his work at the desire of the Farnese family, one of whose members, Alessandro, Duke of Parma, became commander of the wars of Flanders, as commander of the Spanish armies. The history of Strafford is not without merit, though it can hardly be expected to be quite impartial. His rival historian Cardinal Bentivoglio was also biased in favour of Spain against the Protestant Netherlands, yet he was written with considerable freedom, and the work of the Cardinal is generally preferred to that of the Jesuit, but this preference may be partly attributed to the circumstance that Strafford's work is written in a dead language.

STRADELLA, ALESSANDRO, a composer much celebrated in musical history, was born at Naples, about the middle of the seventeenth century. His works, most of which are to be found in the British Museum and in the library of Christchurch, Oxford, are chiefly of a miscellaneous kind, consisting of airs, duets, cantatas, madrigals, &c. One oratorio and one opera comprise the whole of his dramatic compositions that Dr. Burney's diligent search enabled him to discover. The former—Sanz Giovanni Battista—extolled by the most critical historians, has, in his fourth volume, gained a duet from it, as a specimen of the whole; but in the *Ruscelli Musicum* it is a quintet from the same of a far superior order. It seems to be agreed that the study of his works contributed largely in the selection of many great first-rate performers;—of such as Purcell, of Clari, Steffani, A. Scarlatti, and Pergolesi, and this alone is sufficient to bestow on him a lasting reputation.

The personal history of Stradella is so interesting, so romantic when fully narrated, that a brief sketch of it will, we trust, not be thought obtrusive, but have received a more conspicuous place in the history of music. He was not handsome, but remarkable for the symmetry of his form, for his wit and polished manners, and these, as well as his mournful and seditious tendencies, made his conversations desirable in the highest circles. At Venice he was engaged by a nobleman to instruct a young lady of high birth, named Hortensia, who, notwithstanding her family rank, submitted to live with the noble Venetian in criminal intimacy. After a time he was dismissed; and Hortensia, when her teacher raised a new flame in her bosom. The passion was mutual, the loves were married, and fled to Rome, whither they were pursued by two assassins, engaged by the Venetian to punish the inconstancy of his mistress and attempted to carry their design into execution as the fugitives retired, in a dark evening, at the conclusion of the sacred service. But while waiting the favourable moment, one of them, while the musician sung, was seized by the charms of his voice and strains, that, confessing to him what had been their object, they declared their determination to abandon it. The intended victims immediately retired to Turin. There they were pursued by two hired murderers, and though taken under the protection of the Duchesse de Savoy, and lodged in her palace, Stradella received three stabs in his breast, and the assassins found a sanctuary in the hotel of the French ambassador, who refused to deliver them. The wounded man, did not prove mortal, and as a year elapsed after the recovery of the sufferer, and no fresh attempt on his life was made, he considered himself secure for the future. But the resolute Venetian only awaited a more certain opportunity for executing his unquenchable rage. Stradella accepted an engagement at Genoa, to compose an opera, whither he went with his wife. Their enemy, informed of this movement, followed them by the agents of his unrelenting revenge, who, rushing into the theatre, stabbed both of them. With Walther, in his *Lascia Ch'io Pianga* fixes in the year 1670: but Dr. Burney shows that it may have occurred some years later.

STRAFFORD, THOMAS WENTWORTH, after whose birth (March 9, 1612) was born in Chancery-lane, London, the 13th of April, 1633. He was the eldest son of Sir William Wentworth, of Wentworth Woodhouse, in the county of York, where his family are said to have been settled since the time of the Conquest. His family was one of the most opulent as well as eminent of the class known in England under the name of gentry, and had frequently intermarried with the higher gentry. The son of which was born at Wentworth, near Doncaster, in 1660, a year, a very large sum at that time, probably equal to more than three times the amount in the present day. (Stradford's Letter and Dispatches, vol. ii., pp. 105, 106, folio edition, London, 1739, 5th edition, with Knowle's Dedication prefixed to them.) He received part of his education at St. John's College, Cambridge. In 1611 he married the Lady Margaret Clifford the eldest daughter of Francis, Earl of Cumberland. The accuracy of this date, as that of his first marriage, given in different accounts of his family, is not very certain.

Later, went to his father Sir William Wentworth; although the compilers of his Life in the *Biographia Britannica* have chosen, in direct opposition to the statement of Radcliffe, to date a skirmish after his return from the Continent, towards the end of 1618 (by the old mode of reckoning, according to which the legal year began on the 1st of March, but by the new about the beginning of 1619), instead of in 1618, before going abroad.

The same letter also shows that he was from his early years of studious and regular habits. He appears to have taken almost as much pains as Ciceranus recommends for the study of the classics. The model and example of Harrington, that the excellence possessed by him in speaking and writing he attained first by reading well-penned authors in French, English, and Latin, and observing their expressions; so, mouldy, by hearing eloquent men, which he did diligently, to write in the French and Latin verse of his countrymen. He made great care and industry which he used when he was young; in penning his epistles and missives of which subject soever but above all, he had a natural quickness of wit and fancy with great clearness of judgment, and much practice, with which his other excellences, and had it not been that he have brought to that great perfection to which he attained. I learned one rule of him," says Sir George, "while: I think worthy to be remembered; that he met with well-penned oration or tract upon a subject, he always noted down the several points upon the several arguments, inventing and disposing what seemed fit to be said upon that subject to be here read the book; then reading the book, compare his own with the author, and note his own defects, and the author's art and fulness, where he observing well, what he in the author more strictly, and might better judge of: his own wants to supply them. (Stradford's *Let. and Disp.* vol. ii., p. 435.)

In some of Strafford's earlier letters, particularly those written in the first year of Sir Walter's residence in Italy, he shews himself a most assiduous, in the time of James I., there is, though no marks of profound scholarship, a somewhat pedantic display of trite Latin quotations. From these however, though we may judge so far of the extent of Strafford's scholarship, it would be incorrect to estimate his abilities, for in his early letters he did not suffer himself to be led on by the arguments and reasoning of the authors he had read, as might have occurred in the same class: he was not the man to be led on by the arguments and reasoning of the authors he had read, as might have been expected, even his own reason as others, only I confess I did in all things distrust myself, wherein you shall do, as I am extremely well if you do so too. (Let. and Disp., vol. i., 1694, p. 21.)

The letter from which the above quotation is made contains so much good advice, so well and so weightily expressed, that it may bear a comparison with Burleigh celebrated 'Advice to his Son': the resemblance is here most marked, for the greater part of this advice, particularly what regards economy and regularity in the management of his private affairs, temperance in drinking, and abstinence from gaming, it was the rule of Strafford's life. By these means he lived in the highest prosperity, and justly ascribed all to Radcliffe, he strictly adhered. The part of the advice to which he himself least adhered was that concerning his family as a model of demecanum; for even his most intimate friend Sir George Radcliffe admits that's
was naturally exceeding choleric; and the actions of his life show that in that particular he was never able thoroughly to subdue nature.

In the same year in which he was married, Wentworth went into France, having previously been knighted. He was accompanied by the Rev. Charles Greenwood, fellow of University College, Oxford, as his "governor," or traveling tutor, for whom he entertained the greatest respect and regard to the end of his life. In February, 1616, he returned to England. He was returned and sat for the county of Northumberland in the House of Commons in April 5th, and Radeliffe's account as to this date, though rejected by the writers in the "Biographia Britannica," and Mr. MacDiar-

and Notitia Letters made pubbe. In that collection there are two letters (Strafor.t, Let. and Disp. vol. i., pp. 34, 35), to Sir Richard Weston, chancellor of the exchequer, containing very unequivocal overtures, the non-acceptance of which at the time would seem to have produced the ignomious outbreak of patriotic eloquence above referred to.

In June, 1626, the parliament ended. In July Sir Thomas Wentworth, having been reconciled to Buckingham, was created Baron Wentworth. The death of Buckingham soon after removed the only obstacle to higher honours. In May, 1628, he was made Viscount Wentworth, Lord President of the North, and a privy coun- cillor.

The establishment of the Council of the North originated in the frequent northern rebellions which followed Henry IV.'s suppression of the levy made for Ireland. The addition to the levies of the counties of York, Northumberland, Cumberland, Westmoreland, and Durham. The commission, though apparently only one ofoyer and termen, contained a clause authorising the commissioners to bear all causes real and personal, when either of the parties was poor, and de- cide according to sound discretion. This clause was declared by all the judges to be illegal. James issued a new commission, by which the commissioners were not ordered to "rejoice merchants, or any other kind of persons," be it known, through all the manors, 'tis a great scheme to make people, or to control by forms of law, but were merely referred to certain secret instructions which were sent down to the council. Against this however the judges had the courage to protest, and to issue prohibitions on demand to the council. The council were ordered to be enrolled, that the people might have some chance of knowing them.

Dr. Knowler, the editor of the 'Strafford Papers,' in the dedicatory dedication of them to his patron, the grandson of Strafford, had much more of a true friend to Strafford, Wentworth, who was a true friend to episcopal government in the church, and to a limited monarchy in the state, could have no reason, when the Petition of Right was granted, to refuse to bear his part in the service of the public, or to withdraw from the offer of such marks of his majesty was graciously pleased to make him, especially when it gave him an opportunity of setting an example of a wise and just and steady administration. Wentworth's decision to serve the crown in so large and influential a manner was a flagrant violation of the fundamental principle of the Peti tion of Right. His career in the office did not beli re the promise of its acceptance. One of his first acts was to declare that he would lay any man by the heels who ventured into the livery of the crown, such as the abbot of Shrewsbury (Rushworth, vol. ii., p. 129.) And one of the judges (Vernon), who had the courage to resist these encroachments on the ancient laws of the land, Wentworth tried hard to have removed from his office. [Strafor.t, Let. and Disp., vol. i., pp. 129, 130, 131] Also, in the same year 1628, Laud, Wentworth never lost a slip of an opportunity of expressing his bitter dislike of the interference of the judges and common lawyers with his scheme of governing, not by the laws of England, but by the sound of discretion.

In January, 1631, Wentworth was made lord deputy of Ireland. The principle on which he set about governing there was in substance the same as that of his government in the presidency of York. 'These lawyers,' he writes to the lord marsal, "would monopolise to themselves all judi cature, as if no honour or justice could be rightly admini tered but under one of their bencher's gowns." (Strafford, Let. and Disp., vol. i., p. 223.) And he adds, a line or two after, "Therefore if your lordship's judgment approve of my reasons, I beseech you to use them."---"I am one of the king's service, and I shall be answerable with my head."

It is remarkable how frequently he alludes to this last as the test of the soundness of the policy of his measures. They were, in fact, the leading foundation of Wentworth's policy. His theory of government was not very sound, yet he saw far enough to discover that to enrich the king, the way was, to begin by enriching the people. 'For this is a ground,' he says, 'I take with me, that to serve your majesty completely well in Ireland we must suffer more to hold the same dependence upon the crown, and not to abate with any.
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that the plan be proposed does not seem certainly very well adapted for enriching the people. Which will be affected," he proceeds, "by wholly laying aside the manufacture of wooll into cloth or stuff there, and by furnishing them from this kingdom; and then making your majesty sole merchant of all salt on that side; for thus shall they not only have their clothing, the improvement of all their native commodi-
dities, the payment of their rents, and the general welfare of this virtuous itself from hence (strong ties and enforcements upon their allegiance and obedience to your majesty); but a means found, I trust, much to advance your majesty's revenue up to a just improvement of your revenues. The young there, grown, and the clothes there worn, thus paying double duties to your crown in both kingdoms; and the salt outward here, both inward and outward there. He thus sums up the advantages of the measures proposed; —' Holding them from the manufacture of wool (which, unless otherwise directed, I shall by all means discourage), and then enforcing to fetch their clothing from thence, and to take their salt from the king (being that which preserves and gives value to all their staple commodities), how can they depart from us without nakedness and beggary? Which in itself is so weighty a consideration, as a small profit should not bear it down.' (Let. and Disp., i. p. 153.)

And he did benefit Ireland. At his own
risk he imported and sowed a quantity of superior flax-seed. The first crop having succeeded, he next year laid out 1000l. on the undertaking, set up a number of looms, procuring workmen from France and Flanders, and sent a ship to Spain for linen at his own risk. Thus is he the linen manufacturer of Ireland, which in some measure verified Wentworth's prediction that it would greatly benefit that country. (Strafford, Let. and Disp., i. p. 473.)

Wentworth appears to have been of very infirm health, which, thrown with the general calamity of his position in society, will in part account for the acerbity and irritability of temper, and the impatience of any opposition to his will, which throughout his career involved him in so many tribulations. The number of powerful personal enemies which Wentworth thus arrayed against himself appears to us to be a proof of the want of real political talent of a high order. A really wise politician, such as Oliver Cromwell for example, does not raise up such a host of powerful personal enemies. Laud gives a good hint about this in one of his letters. 'And yet, my lord,' he says, 'if you could find a way to do all these great services and de-
line these storms, I think it would be excellent well thought on.' (Strafford, Let. and Disp., i. p. 473.)

Thus it was that the future Earl of Strafford, raised by queen Anne to be an earl, which he had in vain solicited formerly. He was created Earl of Strafford and Baron of Raby, and invested with the title of lord-lieutenant, or lieutenant-general of Ireland—a title which had not been borne since the time of Edward I.

In 1640 the Earl of Northumberland being attacked by severe illness, the king appointed Strafford in his place, to the command of the army against the Scots. He does not appear to have performed anything here to make good either his own high pretensions or the character for valor
given him by some writers. Of his impeachment at the opening of the Long Parliament, Clarendon gives the following account: —'It was about three of the clock in the afternoon of the 25th of October, the Earl of Strafford not being in chamber, nor not well disposed in health, and so not having stirred out of his house that morning, hearing that both houses still sate, thought fit to go thither. It was believed by some (upon what ground was never clear enough) that he made that excursions in order to do the Lord Protector some service of having induced the Scots to invade the kingdom; but he was scarce entered into the house of peers, when the message from the House of Commons was called in, and was the question proposed in the first place of all the Com-
mons of England, impeached Thomas, Earl of Strafford (with the addition of all his other titles), of high treason.

In the article Pivv we have shortly adverted to the trial of the Earl of Strafford for high treason. To the remarks made there, that it was not to be supposed or expected that the Statute of Treasons of Edward III. (23 Edward III., st. 5, c. 2), being made to protect the king, not the subject, would provide specially for the punishment of such attempts as those of Strafford; it does nevertheless appear that Strafford was punishable for having become the instrument for administering the government of the Count
of the North, carried on in direct violation of the Pet
tion of Rights, which during the time ofStrafford being president of that council was the law of the land. How
the Commons changed their course and introduced a bill
attaining, which was passed on the 31st of April, in t1 Commons, and soon after in the Lords. The king with two
of his old attendants of the court, and with struc
teristic of him signed a commission for giving the roy
assent to the bill, and then made some feeble and unava
ning efforts to save the life of his obnoxious minister. 'Tis
remembered, the bill of attainder of Strafford (act of Strafford, p. 404), 'arose from no failure of the impeach-
ment, as has been frequently alleged, but because in the
course of that impeachment circumstances arose which
suggest to the great leader of the popular cause the need
safely of a bill, but this was not to be sustained. Without
stretching to the slightest extent the boundaries of
any statute, they thought it better at once to bring
Strafford's treason to the condemnation of the sources
of law.

Strafford was beheaded on Tower Hill on the 12th of May 1641. In his walk from the Tower to the place of execution his step and manner are described by Rushworth as being those of 'a general marching at the head of an army, 1 row of officers following him in a straight line, and all
undergo the sentence of death.' Within a few weeks af
his death, the parliament mitigated the penalties of their
sentence to his children. In the succeeding reign, the
attamer was reversed, and his son was restored to the earl-
dom.

STRAIGHT, STRAIGHT LINE, PLANE. There is no occasion to define a straight line as matter of information
so that we have here only to consider the definitions which have been given and their relative merits, taking them a
as attempts to produce a mathematical description of straight
ness.

There are three attempts at definition of a straight line by Plato (or one of his immediate school), by Archimedes
about 220 B.C., and by Euclid. The moderns have repeated
these various forms, but have again failed in producing a definition entirely new which did not contain the defects of one or other of the three just
mentioned.

The Platonic definition, according to Proclus, is as fol-
lores: —'A straight line is that of which the middle parts hide (tupos mesopho) the extremities,' a physical definition,
owing its truth to the circumstance of the rays of light proceeding in straight lines, and involving the notion of straightness as a property of the duality of the particle of
line which has been little if at all used by geometrical writers.

Archimedes defines a straight line as the shortest distance
between two points, or at least this definition is often attri-
buted to him, but not correctly. It is one of his postulates
that the Spheres of the Sun and Moon are in the duality of
straight: but he is too well judging a geometry to assign
such a property as a definition. The Arabs substituted the
shortest-distance description for the definition in Euclid, and
accordingly our earlier editions of Euclid do the same; nor
was this flaw removed until 1505, when Zamberti translated
Euclid from the Greek. It has been often supposed that
this shortest-distance definition is good as a definition, though
we must confess to be a little puzzled from which we
do not yet to learn what a straight line is, whether there can be a
shortest distance? That is, how is it known that there are not
many distances between two points, on different lines which
are nearly the same, and some of which will be less than
the distance one another? The answer is, no doubt, that the
mind has a perfect conception of the impossibility of such a
thing; and the rejoinder is—yes, because the mind has a
perfect conception of the shortest straight line: that is to say, the
definition is only saved from causal confusion. Above all, it is
useless. Again, the supposition that measurement of distances on all manner of curves consists to be a preliminary to
to one of the definitions of a science which treats no curve but
the circle, and doubt to succeed, by reasons of certain limi-
ations of process, in measuring distance even on that one, is an incoherence.

Euclid defines a straight line to be that line which lies even
(five straia) between its extreme points. The words if
Low have been translated ex quo by Barocci, \(\text{ex quo\ }\) by Zamberti, \(\text{ex quo\ }\) by Bilingesius (taking some of the oldest translations as specimens). The definition wants precision, but the meaning is obvious. Two points being given, the surrounding space may be viewed in all manner of relation, for two post, the two factor, right &c. The straight line which joins the two points is that which is not more related to one of these notions than to any other; and throughout its whole length takes an even course, without a possibility of being claimed, so to speak, by any of the surrounding parts of space rather than by any other.

In making such a definition Euclid is well aware that he cannot rest any conclusion upon it, and that in the postulate that two straight lines cannot inclose a space lies all his difficulty. Who, if such a definition asked, does he introduce a definition at all? Why not give the reader to understand that a straight line is a notion universally understood and incapable of definition in simpler terms? To these questions the answer may be twofold. In the first place, he is not answerable for the genius of any language but his own, and it is very possible that to a Greek commencing geometry, \(\text{exo\ }\) might be a hard word, and \(\text{exo\ }\) or \(\text{exo\ }\) a real explanation; in which case his definition could be made easier. It might also be that when his reader has chosen a better one. We are not to judge of the force of the last quoted words from the \(\text{exo\ }\), middle Latin, or the \(\text{exo\ }\) or \(\text{exo\ }\) of the English. Secondly, he is evidently in his first definitions, recalling, and not initiating the use of a word which would be used for other words to which both attach a conception, and be tries these words for use by ascertaining that both parties agree on such circumlocution as can be substituted for them.

The proposed geometrical definition, since it applies even to the view just taken of its intent, is the want of words signifying that \(\text{exo\ }\) refers equally to all adjoining parts of space: Euclid is thinking too much of a plane before he has defined a plane. Suppose, for instance, a sphere, and that point might be made to the reader, which joins two points \(\text{exo\ }\) to which reference to all adjacent parts of that sphere is not a straight line, but an arc of a great circle.

Is it possible, taking such allowances in Euclid’s sanctuaries in the figure, to know what shall be, whether difficult or not difficult, capable of use or not capable, a just definition of a straight line? We think it is, as follows:—The Greek geometrically implies (t. 4) A translation of figure without change of form or properties: from this, by first of all the plan of the straight line may be proposed, which we bring forward, not for any value which it has, but because the stipulations of geometry are better understood by consideration of cases proposed for solution than of any others.

1. Let two points (A and B) be said to be at the same distance from a third (C), when a and C being joined by \(\text{exo\ }\), the line CA can be translated. Remaining fixed, so that A shall be brought to coincide with B. A plane is a surface any point of which is equally distant from two given points.

3. A straight line is the intersection of two planes.

In the debates of the normal school, which were taken down in shorthand, and published in 1800, is a discussion on this subject. Language presiding. Fourier, then one of the pupils, proposed the preceding second and third definitions, but without assigning a definition of equidistance independently of the straight line. He also proposed a definition of a straight line as the locus of a point which is equidistant from three given points; which is faulty, inasmuch as the three given points should not be in one straight line, which cannot be supposed until the straight line is defined. Lagrange admitted the rigor of the definition, but complained of presenting a sensible image of the thing defined. Another of the pupils however insisted that the idea of distance involved that of a straight line, which is true of distance as a quantity, though not necessarily so of equidistance. Thomson proposes to define a straight line as one which being turned about its extreme points suffers no change of place. Lagrange, in the debate above alluded to, suggested the same notion. This definition is different from that of Euclid. Let the most tangible illustration of that be considered. Two extremities of the intended straight line be situated in a solid; and let them remain fixed in space while a solid; takes such motion as, under that condition, it is capable of. The straight line, the line which lies if low with regard to the extreme points, then remains fixed. For if any part of it moved, it would be in every position a relation to adjoining parts of space, which would be in a state of constant change. But there is no need to redefine our definition to render it as clear as possible: but we think the student’s own reflection will lead him to make it satisfactorily. But whatever may be thought of the endeavour to describe the diagram of which the student is to be supposed to have the possibility by framing or arguing on definitions, we do not remember to have seen one so well calculated for the mere beginner as the following:—A straight line is a straight line.

1. That such a line can be drawn from any one point to any other.
2. That when terminated, it can be lengthened indefinitely.
3. That such two lines cannot inclose a \(\text{exo\ }\) a space. It is also tacitly assumed that every part of a straight line is a straight line: that every straight line, infinitely produced, divides a plane in which it lies into two parts, and will be cut by any line drawn from a point on one side of it to a point on the other.

The postulates relative to a straight line demanded by Euclid (we do not speak of his translators) are: 1. That a line can be drawn from any one point to any other. 2. That when terminated, it can be lengthened indefinitely. 3. That two such lines cannot inclose a \(\text{exo\ }\) a space. It is also tacitly assumed that every part of a straight line is a straight line: that every straight line, infinitely produced, divides a plane in which it lies into two parts, and will be cut by any line drawn from a point on one side of it to a point on the other. For a plane is the surface any two points of which can be joined by a straight line which lies wholly on the surface. Neither this definition (nor Euclid’s) precludes the necessity of a postulate demanding the possibility of drawing a plane through any straight line. Objection of the student is that the theorem might be made to the reader, which joins two points \(\text{exo\ }\) to which reference to all adjacent parts of that sphere is not a straight line, but an arc of a great circle.

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and on the other sides by great lakes and marshes, so that it is connected with the continent only by bridges. The celebrated fortifications have been razed, and the ramparts converted into public walks. It is rather a gloomy place, the houses being built in the old style, the streets are irregular, and the squares and market-places inconsiderable; it is however clean and well-paved.

There are four Protestant churches and one Roman Catholic chapel. The three principal churches are built in the Gothic style, and contain many fine paintings. The prospect from the lofty steeple of St. Mary's is magnificent. Among the objects of public beauty are—notice the government-house, the town-house, with a noble hall, and a considerable public library, the gymnasium, with a large library and cabinet of medals, the mint, the arsenal, and the water-works by which the city is supplied. The public institutions are—the gymnasium, the normal school for training schoolmasters, a school for soldiers' children, two schools of industry, besides many other schools; an orphan-house, a lunatic asylum, and various other charitable establishments. The manufactures are of various kinds, chiefly woollens, linen, sugar, starch, soap, candles, tobacco, leather, looking-glasses, household furniture, and playing-cards. There are likewise brandy distilleries and oil-mills. The city has a very extensive port, being at least one-third of the foreign commerce of the whole province. The harbour is spacious and safe, and deep enough for ships drawing 15 feet water. The northern outlet by the Gellen Strait has become gradually narrower, and Hassel says it will be closed soon, but that the water-channel will become broader.

Stralsund was built about the year 1269, and joined the Hanseatic League, during its union with which powerful confederacy it had a very extensive export trade in wool and herring to remote countries. At present there are 20,000 houses, and a similar number of inhabitants. The town was naturally fortified, and sustained several sieges; the most remarkable of which was in 1628, when Wallenstein vowed that he would make himself master of it, even though it was fortified by chains to Heaven, but he was obliged to raise the siege after suffering great losses. In 1672 it was the scene of a destructive bombardment by the great elector Frederic William of Brandenburg; and in 1715 by Frederick William I. The Prussian, in alliance with Russia, Denmark, and Saxony against George William, who invaded Saxony in 1689. By the treaty of Kiel in 1816, it was ceded with all Sweden Pommerania to Denmark, and again ceded by Denmark in 1815 to Prussia.

(Müller, Handbuch: Heidemann, Wortertuch; Hassel; Schubert, Hamburger, &c.)

STRAMON' IUM [Datura].

SIRANGE, SIR ROBERT, a descendant of the family of Strange of Ballesky, in the county of Fife, was born at Po- mona, one of the Orkney Isles, on the 14th of July, 1721. After successively acquiring and maintaining the necessary knowledge for the pursuit of a seafaring life, he was apprenticed to a drawing-master. He had studied for a considerable time, when he joined the forces of the Pretender, and was appointed a lieutenant in the Life-Guards, a step he is said to have taken with a view of obtaining the hand of Miss Isabella Lumisden, a lady whom he married in 1747. After the battle of Culloden he sought refuge in the Highlands, where he suffered the severest privations. Subsequently he ventured to Edinburgh, where he subsisted upon the produce of the drawings of the pictures of which he privately disposed of at a guinea each. After his marriage he went abroad, and at Rouen obtained an honorary prize for design, when he proceeded to Paris, where he studied engraving under the celebrated Le Bas, famous for his drawings of the drypoints of which he made such successful use in his own plates. In 1751 Strange settled in London, and soon established a high reputation as an historical engraver, of which class he is considered the greatest in the English school. In 1769 he again went abroad, and executed plates after pictures by many of the greatest of the old masters, and was made a member of the academies of Rome, Florence, Bologna, Parma, and Paris. On his return to England, he was rewarded with every mark of distinction, and in 1767 was knighted. He died on the 5th of July, 1792. He left a widow, three sons and one daughter, amply provided for by the fruits of his industry and ability. Strange is the only Englishman whose portrait is introduced in the painting in the Vatican of 'The Progress of Engraving.' Force, vigour, clearness, and precision are the prevailing characteristics of his style, nor is it lost for the careful distinction which he makes in his plates between the tones of the various materials represented. He was the author of an unpublished treatise entitled 'The History of the Progress of Engraving,' to which he once attributed a portrait of himself. The following is a list of his most important works:—St. Cecilia, the Raffaelle; the Virgin and Infant Christ, with Mary Mag- delen, St. Jerome, and two Angels, after Correggio; Mary Magdalen, the Holy Family flying over the Globe, Venus attended by the Graces, and Joseph and Potiphar's Wife, after Guido; Christ appearing to the Virgin after his Resurrection, Abraham expelling Hagar, Ahab and Ahazaria, and the Death of Dido, after Guer- ton; The Death of Dido, after Guerin; the Death of Titian; Romulus and Remus, and Caesar repudiating Pompeia, after Pietro da Cortona; Sappho conscripting her Lyre, after Carlo Dolci; the Martydom of St. Agnes, after Domenichino; Belisarius, after Salvator Rosa; the Virgin with St. Catherine and Angels triumphing as the latest Jesus, after Carlo Maratti; the Choice of Hercules, after Nicholas Poussin; and the Return from Market, after Philip Wouwerman. Amongst his portrait engravings are the portraits of Bettey, Duchess of Kent; of Queen Henrietta Maria, with the Prince of Wales and Duke of York, after Vandyke. (Memor. of Sir Robert Strange; Aikin's General Biography.)

STRA'NABER [Wurttemberg].

STRA'ZBURG, a town in France, capital of the department of Bas Rhin, 32 miles east of Paris in a direct line, or 204 miles by the road through Chievass-Thierry, Châlons-sur-Marne, St. Dizier, Bar-le-Duc, Toul, Nancy, Lunéville, and Saverne; in 49° 48' N., and 6° 31' E. The town is laid out in a quarter of a mile in length; the market-places are extensive.

Strasbourg was known to the Romans by the name of Argentoratum or Argentoratus. It is first mentioned by Ptolomy, who calls it a town of the Vangiones; but this is an error, as it really belonged to the Tribocii. It was in the time of Charlemagne a free city, and in the time of his descendant Luitzard, for a while subjected to the Franks; it was afterwards reunited to the kingdom of Lotharingia, and in the tenth century incorporated with the German empire. It was during these changes, perhaps in the sixth century, that it exchanged its ancient magnificence for the elegance of Strasbourg, which it received from Strasburg and Strassburg. It was in the landgrave of Alsace; but having obtained the privileges of a free city, it increased in prosperity. In A.D. 1035 it was much suffered by the inhabitants of the city, and the Jews, 300 of whom were in consequence burned. The principles of the Reformation were early introduced, and gained such ground, that, though checked by the emperor Charles V., the Protestants obtained possession of several of the churches. In 1681 Strasburg surrendered to Louis XIV., who had previously gained possession of Alsace. Louis enlarged the circuit of the walls, and so improved the defences as to render it one of the strongest fortresses in Europe. It has remained ever since that period incorporated with France.

The town stands in a flat situation in the valley of the Rhine, which valley has here a considerable breadth, extending from the mountains of the Schwäbisch or Black Forest, to the Vosges. The form of the town is irregular. Some of the streets are regular and broad, and rise from its greatest breadth about one; and its circuit five or six.

It is surrounded by a wall strengthened by bastions, ditches, and outworks, and has at its eastern extremity a citadel and six forts, of which the first is the principa, which extend as far as the Rhine. This river flows a little to the east of Strasbourg, and is crossed here by the bridge of boats of Kehln, a fortress in Baden, on the right bank. The entrance into the city is by seven gates, two on the north side, and five on the north-west, two on the west, and two on the south.

The river Ill flows through the town in a north-north-east direction. After it enters the town it is divided into several branches, which reunite before it quite the place the principal arms, which bear the name of the Bruche, is
navigable, and receives on its right bank the canal of the Rhine, by means of which there is ready communication with that river. Another arm, which has the name of Tanners' Canal, with a tower a short distance from the main, is much used for supplying tan-yards and other manufacturing establishments.

The river can be made to inundate the neighbourhood, by means of a sluice at the point where it enters the town. There are a great number of bridges, some of stone, others of wood. Some of these have been designed by architects, whose direction have been the ditches dug to encircle and defend the town before it had attained its present extent.

Dr. Dibdin, who visited Strasbourg in July, 1818, thus describes the city: It is surrounded by a wall, and within its walls is a population of about fifty thousand. I suspect however that in former times its population was more numerous. At the present moment there are about two hundred and fifty streets, great and small, including squares and alleys. The main streets, upon the whole, are neither wide nor narrow; but to a stranger they have a very singular appearance, from the windows of almost every house being covered on the outside with iron bars arranged after divers fashions. This gives them a very proust-like effect, and it is far from being the least agreeable.

The glassing of the windows is also frequently very curious. In general the panes of glass are small and circular, being confined in leaden casements. The number of houses in Strasbourg is estimated at three thousand five hundred. There are now only seven bridges in the interior of the town. . . . The houses are generally lofty, and the roofs contain two or three tiers of open windows, garret fashionable, which gives them a picturesque appearance; a mixture of beauty and taste, as granaries, to hold flour for the support of the inhabitants when the city should sustain a long and rigorous siege.' (A Bibliographical, &c. Tour in France and Germany, by the Rev. T. F. Dibdin, D.D.) From another authority we learn that the streets are about the hundred and sixty, and are for the most part crooked and narrow; that there are several public squares, of which the principal is the parade, planted with trees, adjacent to the citadel; that the houses are for the most part built of stone, and that the church-towers are the chief objects of the town. The casements are replaced by others of modern construction. (Dictionnaire Geographique Universel, Paris, 1832.)

The principal public building is the cathedral of Notre Dame, a Gothic edifice of singular beauty. The nave and choir have a total length of 332 English feet, of which 244 belong to the nave: the width of the nave, with its side aisles, is 132 feet, but the height of the nave is only 72 feet. Nine massive clustered columns, the larger of them having a circumference of 72 feet, the smaller of 50, the latter with no side aisles: it is 67 feet wide, and much lower than the nave. The sides have been covered most incongruously with a number of pillars and pilasters of Grecian architecture. There are two chapels, those of St. Laurent, St. Catherine, and others, of the time of Saint Sepulchre, which is the crypt; and twelve altars, of which the two principal are in the chapels of St. Laurent and St. Catherine. The windows are adorned with abundance of stained glass: but generally of a sombre tint, and producing a gloomy effect, with the exception of the circular or marble-gold window of the west front, which is brighter. There is a stone pulpit, unequaled for the richness, variety, and elaborateness of its sculptured ornaments; an organ of admirable power and sound, and a clock, which is loud and clear, and accounted one of the wonders of the place for the variety and skillfulness of its mechanical contrivances, and the elaborateness of its ornaments, but now much out of order and useless. The most striking part of the cathedral is the western front, a masterpiece of modern architecture. The windows are divided into three compartments by its ornamented buttresses (two of which are at the angles, and the other two in the centre); and these compartments, again into three portions by horizontal bands. The lower portions are occupied by three porches, that in the centre being the most ornamented and the loftiest. In the second or middle portion the most striking feature is the three equestrian statues of the emperors Rudolph of Hapsburg, in canopied openings in the buttresses. A fourth canopied opening is unoccupied.

The third or upper portion has some beautiful windows; and the northernmost of the three compartments is surmounted by a tower and spire, having at each of the four corners of the spire a large clock, and a small bell. The spire rises to the height of 500, or perhaps 536 English feet. The cathedral was commenced near the close of the thirteenth century; and the external structure, as it now appears, was completed about the beginning of the fifteenth century. There was much in the west front that had been built in the thirteenth and fourteenth centuries. He superintended the erection of these parts until his death, a.d. 1318. The tower was not finished till the middle of the fifteenth century. The architect who completed it was John Hütt, a native of Cologne.

The principal public buildings:

The other principal buildings are the ancient castle, with a terrace-wall on the Bruche; the office of the prefect; the town-hall; the public granary; and the theatre, adorned with an Ionic colonnade, and having a spacious and elegant interior. There are several public walks; among which are the promenade of Le Broglie, which skirts the Towers' ditch, the ramparts, which are planted with trees, the esplanade in front of the citadel, the suburb of Robertiau or Rupersau on the north side of the town, and the islands of the Rhine, on one of which a monument has been eroded to the memory of the famous Bonaparte (Desaix).

The population of Strasbourg, in 1831, was 45,242 for the town, or 49,712 for the whole commune; in 1836 it was 57,883 for the commune. The trade of the town is very considerable: its exports include silk goods, wines, hemp, starch, alum, oil of vitriol, white-lead, stone, cutlery, pins, combs, cast-iron goods, earthenware, porcelain, enamels, soap, oil from seeds, suet or chichory, morocco and other leather, straw and other hats, woolen and cotton stuffs, cotton yarn, hosiery, printed flannel, sail-cloth, oilcloth, thread, carpeting, furs, paper-hangings, playing-cards, &c. There are bleach-grounds, dye-houses, rope-walks, tan-yards, breweries, printing-offices, plaster-kilns, tile-yards, an iron forges, a type-foundry, a sugar-refining-house, a royal smeltitory, &c. The publication and sale of books is an important branch of industry at Strasbourg. There is a considerable trade carried on with other parts of France, and with Holland, Germany, Switzerland, and the III and their connected navigation; and much business is done in the produce of the surrounding territory, which includes corn, wine, tobacco, madder, hemp, hops, saffron. This is now, in four important yearly fairs, much frequented by the Germans. Before the Revolution there was at Strasbourg a Protestant University, with four faculties. The town council or senate in 1538 as a gymnasium or public school: and in 1649 was changed into a college by order of granting degrees in arts, by the emperor Ferdinand II., a.d. 1566; and was raised to the rank of a university by the emperor Ferdinand II. a.d. 1621. There are now two seminaries for the Catholic clergy, and a Protestant seminary, and a Catholic theological seminary; a faculty of theology of the Lutheran body; and
faculties of law, medicine, science, and literature; a normal school for training schoolmasters; a school of mid-
wives; a school of music; a school of singing; a college, with a philosophical apparatus; a museum, a
cabinet of natural history, a cabinet of anatomy, an ob-
servatory, a botanical garden, where lectures are delivered, and
many libraries, above 50 in number, which confers premiums; a society for agriculture, sciences, and arts; a Protestant Bible society; a society for
the relief of young persons discharged from prison who have
shown sympaties of penitence; public baths; a noble ar-
senal; a school of art; a medical college; a sumptuous
vast barracks for cavalry, infantry, and artillery; a mont de
pietà or loan society; three hospitals, including one for
orphans and one for foundlings; two military hospitals; a
military prison, a goal, and a house of correction, to which
are assigned the convicts of those departments of government
offices for fiscal, judicial, and administrative purposes; a
mint, and a government stud (dépôt des étalons). It is
the capital of the department; the seat of a bishop, who is a
suffragan of the archbishop of Besançon, and whose diocese
comprehends the departments of Bâle Rhin and Haut
Rhin; the seat of a Lutheran consistory, and of an ac-
démie universitaire, and the head-quarters of the fifth mil-
tary division, which comprehends the two departments of
Bâle Rhin and Haut Rhin.

Strasbourg was the birthplace of Mentel, one of the fathers of the art of printing; of General Kleber, who was
left by Bonaparte in command of the French army in Egypt;
of the classical scholars Bruneck, Oberlin, and Schweighae-
s; of the brilliant general and orator of the Old Testa-
ment, Dr. Thomas, of the liberal doctor of the Old Testa-
ment, Dr. Thomas, of the liberal doctor of the Old Testa-
m, and of the scholar. The population of the town is partly Protestant and partly Roman Catholic.

German may be considered as the native tongue of the inhab-

tants; but among the educated classes both German and
French are equally used.

The arrangement of Strasbourg has an area of 546
square miles, and comprehends 162 communes, with a
population, in 1831, of 205,929, and, in 1836, of 218,839.
The town contains two crests, each bearing the
crest on the arm of justice of the peace. The bishopric dates from the fourth
country: the bishop had formerly the title of prince of the
city, and was a suffragan of the archbishop of Mainz or
Metz.

STRATFORD-UON-AVON, a municipal but not
parliamentary borough in the Stratford division of
Warwickshire, 108 miles north west of the General Post-office, London, by Uxbridge, Ber-
consfield, Wycombe, Oxford, Woodstock, and Shipston-on-
Stour.

Stratford was a place of some consequence three centuries
before the Conquest. The manor was included in the per-
sessions of the bishopric of Worcester, the holders of
obtained charters from the elder kings of the Plantage
family for a market and five yearly fairs. In the reign
Edward I., the castle and town were granted to the
Warwick and duke of Northumberland, and has since
the passed through various hands. There was some skirmish
here in the great civil war (A.D. 1642-3). But the principal
interest of the town is derived from its having been the
birth-place of Shakespeare (A.D. 1564), and the place to
which he retired in his matuer years, and where he died (A.D. 1616). [SHAKESPEARE, WILLIAM.] In A.D. 1679 a festival
termed the Jubilee was celebrated at Stratford, in honour of
Shakespeare, under the direction of Garrick.

The festival was attended by a great concourse of persons of rank: but the
inequality of many of the arrangements provoked the
satire of some of the wits of the day. A triennial festival in
honour of Shakespeare has been celebrated these last few
years.

The town stands on the west or right bank of the
Avon and is approached from London by a long stone bridge
pointed arches, erected in the reign of Henry VII.
at the sole charge of Sir Hugh Clapton, lord mayor of
London. It is nearly a mile long, and is in two parts, one
bridge just below, by which a railroad is carried across the
river and at the south end of the town is a wooden foot-bridge.
The streets are irregularly laid out, but the principal ones
are well-paved and remarkably clean. They are bordered
with trees which are both luxuriant and very tall. They are
commodious and well-built: some of the modern ones are
interlaced among them are capacious and are lined
some. The town has increased considerably during the
last few years, and many houses have been built in the
ous. The church is at the south-east corner of the

Thus, after the battle of Vittoria (1813) the allied British
and Spanish armies being at a great distance from the
original base of operations in Portugal, and it being intended
to carry the war into France, Lord Wellington undertook
to besiege St. Sebastian and the blockade of the
thern, in order, by the possession of those places, to have secure sta-
tions for his recruits and magazines while the army ad-
anced into the mountainous districts between St. Jean
Paul-de-Fort and the sea. On the other hand, the convic-
tion, in 1819, that the British army would be compelled to
act entirely on the defensive, induced the English gen-
to take measures for a retreat into Portugal, and to ex-
cess many months before the retreat took place.

The French, however, were now in possession of a
chain of strong redoubts on the north of Lisbon, in an ex-
pection of being able to resist effectually the
superior forces of the enemy.

The Marshal Soult, in 1813, in oppo-
tion to that of Lord Wellington, appears to have
well-illustrated the nature of the strategic operations. The Fre-
general decided to advance towards Pampeluna in the hush of
being able to succor that place, and afterwards to in-
roduce his army again into Spain. He wished to
command the road along the Spanish frontier, by
might have got to the rear of the allies in a fertile
 Gerry, where his army could have found sustenance. (Nap.
vol. v.) This project failed, and the French army to set on the defence
Marshal Soult took measures for protracting the war to a
utmost.

In the defence of an extensive territory, since it is gen-
ally impossible to cover the whole, the principal of the
strategy indicated that the army should be kept in force a
few of the most important positions. By securing these, the
designs of the enemy may be more effectually frustrate
than if it were attempted to occupy every post in the con-
try, of the various different divisions of which the army was
the fear would have been increased by the deaths of
the various divisions. By retreating behind these strong
positions, the enemy would have been defeated, or at least
weakened, by his movements by rendering it dangerous for him
to go near a force which might prevent him from drawing
supplies from his magazines. The enemies attended the
strong position of the French army, and was strongly
represented in the person of the Marshal Turenne. The
French general caused the seven
corporal of his army to be drawn towards the
before such a manner as to excite notice; and from this
sudden appearance the army was induced to
in the number of the enemy.

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town, near the bank of the river. It is a large and handsomely cross-church, the nave only separated for services.

The transept, tower, and some parts of the nave are early English. The tower appears to have been strengthened by underbuilding in the antient arces by one or two courses of clay. The woodwork of it is decorated, with various circular windows, having varied tracery. The south aisle is decorated, with some good windows; the west end of the nave, with the piers, arches, and clerestory, are perpendicular, as is the west front. The nave is late perpendicular, and a fine specimen of its date. On the north wall is Shakespeare's (Shakspere's) monument; on the south side are some stone stalls, and there are many of the wood stalls remaining. In the south side of the nave are the remains of antient effigies of some members of the family. The windows are portions of good stained glass. The present font is modern; the antient one, after being long a receptacle for rain water, is now carefully preserved in a gentleman's garden. It appears to have been perpendicular, of elegant design and good execution. The same gentleman also preserves part of the antient cross. (Rickman, Essay on Gothic Architecture, Appendix.)

The remains of Shakspere are buried in the chancel, on the north side, and are covered with a stone bearing this inscription:—

Good friend, for Jesus sake forbear
To kick with your inchin'd bare;
Ne'er cast a stone but where it lies,
Or it may chance to murder my bones.

The monument against the wall is surmounted by a half-length effigy of Shakspere, executed with some taste and skill. It was originally coloured to represent life. Beneath the effigy is a poetical inscription consisting of a Latin dissertation in English verses, each line of the inscription is the record, 'Omer A.D. 1616, at Stratford on Avon. 23. Dec. 23. Ap.' The church at Stratford was collegiate.

Besides the parish church there is a chapel-of-ease, antiently the chapel belonging to the brethren and sisters of the Holy Name of Jesus. There were 240 children, four sisters, and fourteen religious, with 664 children (viz. 432 boys and 232 girls, and 28 children: of sex not stated); and three Sunday-schools, with 263 children; besides which, two of the day-schools, partly supported by voluntary contributions, with 130 boys and 60 girls, were also Sunday-schools. Two of the day-schools, with 130 boys and 70 girls, were national schools; another, with 12 boys, was the free grammar-school; and a fourth, with 28 children, was supported by voluntary contributions, the remainder, except the two which were also Sunday-schools, were private endowed schools.

STRAFORD, TENNY. [Buckinghamshire].

STRAWDON, STONY [Buckinghamshire].

ST.ATA. In Geology, both the separately deposited layers of rock, and the rocks formed of these layers, are called strata. The name of the latter was given by the celebrated Dr. William Smith uses the term in the latter sense, and in general this is the meaning attached to it in those useful tabular descriptions of the "Strata of Strata," in various districts of England and Scotland. In these and local descriptions of rocks, the several beds are commonly enough called strata (couches, French). As a general scheme showing the rank frequently assigned to these and other terms, the following view may be useful, the most comprehensive term being to the left—

Systems, Formations, Strata, Beds, Laminae.

The term series and group are very conveniently employed to collect under one head for purposes of reasoning, any of the laminae, beds, strata, formations, or systems of strata, which are separated from one another by a considerable interval of time, or by a stratum of peculiar character.

The parish of Old Stratford, in which the town stands, has an area of 6860 acres; the population in 1831 was as follows: the town, 2789; the upper part, 172; outskirts of the borough and other parts of the parish, 1591; together, 5171. There were in the town 678 houses, inhabited by 633 families; 21 houses uninhabited, and 1 building. The only manufacture is that of Pottery. The church has four bells; it appears to be increasing. The navigation of the river approaches here. The Stratford-upon-Avon canal runs from the north side of the town to the Worcestershire 

Birmingham canal in the parish of King's Norton near Birmingham. It was made under several acts passed from A.D. 1793 to A.D. 1831. The Stratford and Moreton railway (constructed under Acts passed from A.D. 1821 to A.D. 1833) extends from near the termination of the canal to the town of Moreton-in-Marsh, Gloucestershire, 16 miles, with a branch (23 miles) to Shipston-on-Stour, in a detached portion of Worcestershire. The railroad consists of a single track, and is built under A.D. 1831, and crosses the Avon by a bridge. The coal brought by the canal from the South Staffordshire Coalfield (Staffordshire) is sent forward to Moreton and Shipston by the railway; and stone and agricultural produce are brought back. The market of Stratford is now held on Friday, and is a considerable corn and cattle market. There are two yearly fairs, beside a statute-fair and several great cattle-markets.

Stratford is a municipal borough, but the borough limits do not include the whole town. The corporation was formed by a charter of Edward VI., A.D. 1553; and by the late Municipal Reform Act has 4 aldermen and 12 councillors. An enlargement of the boundary has been recommended. The corporation grants are not to be extended, except on petition and grant. The borough courts had fallen into disuse previous to the passing of the act. The income of the corporation is considerable, consisting of the produce of the estate of the guild of the Holy Cross, and of the tithes of the parishes of Stratford and Priors Marston, belonging to the parish church. The corporation maintain an almshouse and the free grammar-school, and pay stipends to the vicar of Stratford and to a chaplain or vicar's assistant.

The living is a vicarage, of the clear yearly value of £391, with a glebe-house; it is in the rural deanery of Kinerton and Kington, in the archdeaconry and diocese of Worcester.

There were in the whole parish, in 1833, two infant-schools, with 240 children, four sisters, and fourteen religious, with 664 children (viz. 432 boys and 232 girls, and 28 children: of sex not stated); and three Sunday-schools, with 263 children; besides which, two of the day-schools, partly supported by voluntary contributions, with 130 boys and 60 girls, were also Sunday-schools. Two of the day-schools, with 130 boys and 70 girls, were national schools; another, with 12 boys, was the free grammar-school; and a fourth, with 28 children, was supported by voluntary contributions, the remainder, except the two which were also Sunday-schools, were private endowed schools. A general scheme showing the rank frequently assigned to these and other terms, the following view may be useful, the most comprehensive term being to the left—

Systems, Formations, Strata, Beds, Laminae.

The terms series and group are very conveniently employed to collect under one head for purposes of reasoning, any of the laminae, beds, strata, formations, or systems of strata, which are separated from one another by a considerable interval of time, or by a stratum of peculiar character.

The parish of Old Stratford, in which the town stands, has an area of 6860 acres; the population in 1831 was as follows: the town, 2789; the upper part, 172; outskirts of the borough and other parts of the parish, 1591; together, 5171. There were in the town 678 houses, inhabited by 633 families; 21 houses uninhabited, and 1 building. The only manufacture is that of Pottery. The church has four bells; it appears to be increasing. The navigation of the river approaches here. The Stratford-upon-Avon canal runs from the north side of the town to the Worcestershire
chair of mathematics and navigation. He wrote several works on hydraulics and hydrostatics, and upon naval architecture and navigation. In 1801 he was appointed by the government of the Italian republic to the chair of navigation in the University of Pavia, and under Napoleon's government of Italy he was made inspector-general of roads, rivers, and canals, and sonator of the kingdom and knight of the iron crown. After the Restoration the emperor of Austria gave him the cross of the order of St. Leopold. Count Stratico died at Milan, in 1824, at the age of ninety-four. His principal works are—1. Raccolta di Proposizioni di Idraulica ed Idriaulica, Padova, 1773; 2. Vocabolario di Marineria, 3 vols. 4to, Milan, 1813-14, a work which was wanted in the Italian language. Stratico collected the maritime expressions used by the Venetians, Piemontese, and Genoese, in the time of their maritime greatness, and added the modern expressions adopted from the French and English; 3. Bibliografia di Marina, 1823; 4. M. Vitruvii Pollioni Architettura cum Exercitationibus J. Poleni et Commentarii Variorum, Udine, 1825.

This is an excellent edition of Vitruvius, with important illustrations and comments by Poleni and Stratico, and was published after the latter's death. Stratico was one of the most distinguished men of science in Italy. His cabinet of models for shipbuilding, and his collection of books relative to the art of navigation, were bequeathed by him to the Lombardo-Venetian kingdom, and they have been placed in the library of the Institute of Milan.

(Maffei, Letteratura Italiana: Biographical Notice of Stratico, Theologo of Florence, vol. vi.)

STRATIFICATION. Mineral masses, separately deposited, and arranged into parallel layers under the influence of gravitation, compose a large portion of the known rocky crust of the earth, and are called stratified rocks; other masses, in which no such successive deposition and tendency to be bounded by originally horizontal surfaces is traceable, are locally prevalent, and receive the name of unstratified rocks; they are generally supposed to be of igneous origin; the former are known to be the fruit of sedimentary aggregation under water. To each class there are exceptions. Parts of certain limestone rocks, formed in water, as modern coral reefs, are not at all or very slightly stratified; and certain melted rocks which have spread in successive sheets like lava over antient surfaces, or have been forced by great lateral pressure between really stratified rocks, often assume the stratiform aspect. Without now dwelling on these and several other exceptional cases, it is our purpose to present a general view of the present state of knowledge of the phenomena of stratification, as exhibited in rocks which show clearly the fact of their mineral particles having been separately subject, during the aggregation of the mass, to the influence of gravitation, while partially supported in media lighter than themselves, as water and air, and generally influenced by lateral movements, such as occur in a state of nature in those almost universal fluids.

1. Let us suppose a case of a shower of comminuted mineral matter falling through a limited section of air on the ground. It will be collected in a conical form, the slopes of the cone having reference to the velocity of descent of the sandy particles, the mutual support they yield one to another, and the form of the surface on which they fall. Omitting these sources of variation, the slopes of the conical heap will be generally within moderate limits of uniformity, and the inclination of these slopes constitutes what is called the angle of rest. A second shower of such sandy matters falling uniformly, will come to lie with a parallel sheet, and thus conical strata may result from such operations repeated. (See diagram No. 1.) The nearest analogy to this is shown by the diagram No. 2.

If further we suppose a shower of ashes or sands to be much affected while falling by horizontal currents of air; in this case the supposed conical heaps No. 1 will be drifted, so as to show stratification inclined or dipping from the northward. (See diagram No. 3.) Such an effect might follow the drifting of sand which had fallen into heaps.

Laminated deposits of sand by the effect of wind.

If the currents of air changed their direction at intervals, there would arise complication of the strata, oblique stratifications, such as are often seen in sandy rocks and sand hills, and these would be more or less distinct as the interval between the winds had been made; by vegetation, sediment, or any other cause of consolidation of the surfaces.

3. On surfaces of loose sand once deposited, under whatever of the influences stated, winds have the power of producing other effects; winds owing among the inequalities of the surface, or other causes, oblique stratification, or to the name of stratification.

Excavation of ravines in sandhills by wind.

Horizontal section of strata formed by conical superposition (theoretical).

Type of stratification occurs in a volcanic cone; where how the showers of ashes falling not uniformly, but in different quantities in different directions, the result is a concave or imperfectly concentric stratification, characteristic of the cause, and presenting on a cross-section an angle between the layers.

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Excavation of ravines in sandhills by wind.
Near the shore various causes locally in operation are known to produce on the sea-bed that oblique and variously directed lamination which has been already noticed as an effect of wind (diagram No. 4), and may be seen as an ordinary occurrence in the sections of "silurium" and in the beds of some of the fluvial deposits which fill the river valleys. (See the notice of this effect in the valley of the Arno, in Lyell's *Principles of Geology.* ) Among the stratified rocks this appearance is common. It occurs in the deposits of many of the so-called "strata" supposed to have an original marine origin; at Nottingham in new red-sandstone, which contains no internal evidence of the nature of the water in which it was arranged; in millstone grit of Yorkshire, and in the oolite of Weston near Malton, and Old Down near Bath, which are all deposits from the sea. It is perhaps impracticable to determine by mere inspection of the oblique lamination alluded to the exact order of phenomena which occasioned it. Tidal agitation, fluvial violence, the force of temporary inundations, sea currents, and all of these may have been concerned in the phenomena of this nature, which are so frequent in pebbly sandstones, and in general we may be justified in believing that such appearances may be safely ascribed in most cases to irregular re-illumination of the strata; while in regard to the more regular and extended parallel stratification of ordinary micaceous sandstones, and still more the fine uniform deposits of clay and argillaceous limestone, must be referred to the wider and gentler influence and longer suspension due to calmer, that is to say, generally deeper water, farther from shore.

The origin of the materials of stratified rocks is seldom obscure. Conglomerates full of pebbles rounded by attrition, sandstones with grains worn and rounded, shales and clays with broken and scattered mica, are derived from the breakers. Such rocks are represented in the deposits of the sea, as well as in the beds of rivers which change irregularly their course. The pebbles are almost always derived from volcanie dust straitified in the water which received the shower of ashes. (No. 6.) Besides showers of ashes, lakes and the sea receive comminuted mineral substances from shores wasted by tides and storms, and from rivers which transport detritus from the interior of the country. In a very calm lake the sediment from the influx of all these derives its influence from the wind. The arrangement of the strata is probably such as to exhibit successive layers dipping forward into the lake, but there may also be some more horizontal lines depending on the separation of the coarser and finer sediment, owing to their unequal falling velocity in water. Moreover the coarser sediment will fall near the point where the stream enters, and the finer will be longer suspended in water, be transported farther, and rest on more horizontal surfaces, and thus a new complication of the strata will arise, as represented in No. 7.

Deposition of coarse gravel and sand (g) and fine clay (c) in a lake by a river (r).

The earthy materials poured into the sea by rivers follow the same general laws of distribution, but are subject to the additional influences of storms and tides. The agencies are exhibited in great distinctness on coasts which confront violent winds and the full oceanic flow, and which are margined by pebbles and sands. The sands with ripple-marked surfaces gently inclined extend to some distance below low-water, the pebbles spread upwards in more steeply inclined banks thrown up and left by the breakers in heaps, long parallel ridges, and terraces. A contemporaneous surface of deposition in such cases may be represented in No. 8, where clay or sand below low-water, and pebbles between low and high water, appear in a continuous layer. Such a surface differ from those that found under a calm lake by the concave slope of its pebbly bottom towards the shore, while the lake deposit has convex slopes in the same part.

Such appearances, at least partially, may perhaps be recognised among the strata accompanying coal, and in other groups of rocks where the unequal size of the granular materials and antient exposure of these to littoral agitation supply the necessary conditions.

Consolidation of mass is the first of these changes to which we may here allude. It appears to be a phenomenon principally due to pressure; as in the buried peat of Dartmoor, and the buried clays of Holderness, the originally light and uncondensed matters have been compressed to some considerable firmness, solidity, and weight; so in respect of ancient clays, mere pressure appears to be a sufficient cause for their condensed, often ahsly consistence. But more than this must be appealed to for the induration of slate, coal, limestone, and sandstone. The particles of these rocks cohere with force, by a process of internal molecular arrangement; and a fair inference is, from numerous facts, that among the most influential of the exciting causes of this molecular action is the internal heat of the globe—locally manifested in the induration of strata masses in the beds of rivers which change irregularly their course, igneous rock masses, and generally exhibited in the hardness, symmetrical structure, and crystalloid aspect of the lower and more antient strata, which may be supposed to have been more subject, and for a longer time than the others, to the influence of such than heat.

Very unequivocal signs of this action of heat appear in the vicinity of the granite rocks of Cumberland, Devon, etc.
Cornwall, Winklow, &c., and perhaps they are seldom absent from such situations. One of the most ordinary effects is the development, in the mass of the stratified rocks, of peculiar crystals, as felspar near the granite of Wusthal Head, in virtue of which slates become porphyry; of hornblende and chalciotite in those of Skiddaw, just as garnets are developed in baccillaceous breccia near the trap rocks of Teesdale and Anglesey. [ROCKS.]

There is some danger of carrying too far the application of this doctrine. The metamorphism of rocks is a real and very extensive phenomenon, but there must have always been a reason for referring to this class any peculiar appearances of stratified rocks which differ from the ordinary appearances of common aqueous sediments. We must not ascribe to re-arrangement of molecules what is not consistent with such an effect, nor without examination call textures of rocks imperfect crystallization and re-arrangement of molecules which perhaps may be only due to disintegration and re-arrangement of masses.

A case of this kind is very important; the primary strata of greensand and mica-schist are, without examination, but merely by applying as a universal consequence what really depends on very partial inquiry, declared to be crystallized, or crystalline, or crystallized rocks; when, in fact, in many cases they are really, as MacCulloch knew, stratified in the strict sense. The disarrangement of crystalline rocks, and in others show evidence of the same origin, disguised by subsequently applied heat. [GEOL. — Primary Periods.]

Cases of re-arrangement of particles depend on molecular actions, not excited by heat, but determined to particular centres by the previous existence there of solidified bodies. Oolite is an example of common occurrence among limestone of the secondary class, and few things are more interesting to examine than a polished slab of the oolite of the mountain limestone of Bristol and Lancashire, or the pisolithic of Wills. In the centre of the spherical grains of the former, and in or near the axis of the less regular nodules of the latter, are grains of sand, bits of shells, or small foraminifers, and round these parallel or concentric layers are neatly and concentrically arranged. An extremely large and irregular pisolithic nodule gives us the link between these concretionary arrangements and the "nODULES" or "balls" of limestone and ironstone which enclose pieces of plants, leaves of ferns, shells, bones, or fish-scales, and lie in parallel layers in the coal-shales, lias-clays, &c. These balls are evidently formed by accretion round the organic objects which they enclose, and the process is the more curious, because the matter of the balls is usually more calcareous or more ferruginous than the mud from which they are formed, and seems to have been collected from out of it by some peculiar elective attraction depending on the nature of the organic body. [See Diagram No. 9.]

No. 9.

Re-arrangement of deposited matter in nodules, round organic or inorganic masses; a, one of these cored as in Separtaria.

In addition to this process it has frequently happened that the "ball" had become cracked internally across by subsequent changes during consolidation, and the cracks are filled by carbonate of lime, iron pyrites, silice, &c., introduced through the apparently solid texture of the external parts according to the peculiar circumstances of the operation. [Crystal growths developed in argillaceous rocks, analogous to what is supposed in the case of mineral veins, the internal cavities become filled, and the result is the sep- artarium, for whose formation internal heat was once deemed necessary by the advocates of the Huttonian hypothesis. (Physics, p. 230.) During the course of its formation in its various, and aggregated under aqueous agencies so diversified in respect of power and direction, it is not surprising that the stratified rocks present themselves in a variety of appearances. It is clear that in the same bed of the argillaceous and siliceous beds mentioned, or in the same bed or stratum of the calcareous, argillaceous, arenaceous, and pebbly deposits; that in different basins contemporaneous deposits might be extremely unlike; and that metamorphism, more or less important, must be allowed to have often further increased such original diversity. Yet, notwithstanding these limitations, it appears to be a fact sufficiently established that there are general characters of mineral composition and structural aggregation which are associated with the strata of each great period of the earth's history, so much or less consistently distinguishable one period from another. [GEOL.]

STRATON, the son of Acrisius, and a native of Lampascus, a Peripatetic, who about B.C. 256 undertook the charge of the Peripatetic school after Theophrastus. He was the last of the Stoics. As he lived a life of holiness and was well paid for his services.

Respecting his doctrine only scattered hints can be gathered, as all his works have perished. He differed from his master Aristotle on certain points. He maintained that occurrence was a sufficient proof of the truth of a proposition, and that it could not be explained away in either of the two senses, inherent in all matter; which principle causes all composition and decomposition of bodies; that the world, in consequence, was not formed by an extraneous deity, nor by any intramundane animating pervading intelligence; but it was formed by the innate forces of matter, which merely creates and dissolves. He was called Physicus (physicus) from his making physical matters his chief study. A list of his works is given by Diogenes Laertius (Straton) and a copy of the philosopher's testament.

Eighteen of the names of Straton are enumerated by Diogenes.


STRAW-PLAT MANUFACTURE AND TRADE.

The domestic character of this branch of industry, which renders it peculiarly important as a means of affording employment to small mineral and chemical districts, may probably account for the circumstance that very little is known of its history. An interesting account of this manufacture is given in M-Culloch's "Dictionary of Commerce," in the abstract of the "Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce." From these and some other sources of information, the following details are given.

The article first alluded to (which is stated to be written by Mr. Robert Slater, of Fore Street, London) observes, that it is not known when the manufacture of hats or bonnets of platted straw first became important in Italy, where it has long formed one of the leading pursuits of the
agricultural population, but that it appears from Corryat's 'Crudities,' published in 1617, that 'delicate straw hats' were worn at that time by both men and women in many places in Piedmont. Corryat states that many of these hats had at least a hundred seams, from which it is evident that they were made at that time. The same article states that the straw-plat manufacture does not appear to have been followed in England for more than sixty or seventy years, as it is within the remembrance of some of the workers, and that it is now decadent. So that in many of our towns straw hats made by the wives and daughters of the farmers used to plait straw for making their own bonnets, before straw-plating became established as a manufacture. This was published in 1834. Gipsy straw-hats were worn by ladies in this country about 1786, and were formed of English straw, (vol. iv., p. 806). When Arthur Young visited Dunstable, in 1788, the straw-plat manufacture appears to have been established, though not very extensively. He says (Six Months' Tour, vol. i., p. 19). At that place is a manufacture of more equal parts. Before hay have been invented, the perfection of neatness, and make of hats, boxes, baskets, &c. a large quantity annually; but not a great number of hats are employed by it. In the Commercial Gazetteer we find the plait greatly depends. It has been established, published in 1802, Dunstable is described as a town in the neighbourhood of which the women and children are employed in making hats, baskets, and many fancy articles, of straw, which in their hands assumes a vast variety of figures and forms, and is the manufacture, especially since the straw hats have been in general request among the ladies. The large size of the wheat-straw used in this country for plaiting prevented the home manufacture from entering into competition with that of Switzerland, and it was not the purpose of the straw grown for the purpose in Tuscany being much smaller, as well as superior in colour. This difficulty was in some degree overcome by the expatriate adopted in England towards the end of the last century, of splitting the straw with a long gill. This gives a different level of whole straws. The operation of splitting is performed by small cutting instruments called machines, which have a number of sharp edges so fixed as to divide the straw, by a motion in the direction of its length, into five, five, or more pieces. Before hay have been invented, straws were occasionally split with knives by hand; a process which was both tedious and unsatisfactory, since it gave no security for the uniform width of the splints, upon which the beauty and finish of the manufacture, and the ingenuity of the person who contrived the machine used for this purpose was rewarded by realising a fortune of 30,000l.; but a communication from a correspondent at Watford gives a very different account of the matter. Our informant states that he made an inch wide, by an inch in thickness, of what he callsmachines, by which he was enabled to make as many as 300,000 to 600,000 annually. A female who was present asked him to give it to her, observing that if he could not make money of it, she could. She had the instrument, and gave the boy a shilling. He was subsequently apprenticed to a blacksmith, and, on visiting his friends, he found them engaged in splitting straws with a penknife. Perceiving that the operation might be much better performed by an apparatus similar to that which he had made some time before, he then made some machines of iron on the same principle. So much cheaper than his machines, and so much better, that he only realised one shilling. The inconvenience of the process as performed by hand may possibly have led more than one individual to devise similar means for overcoming the difficulty. Be this as it may, the introduction of split straw, and using the machines, has been so attended with the utmost success, that it has increased the number of straw hats and bonnets of all kinds, and has led to great improvement. As early as 1805, the Society presented a gold medal to Mr. William Corston, of Lodgate-hill, for a substitute, of his invention, for Leghorn straw hats. His plaiter, Mrs. Corston, states that some specimens had been examined, by London tradesmen, who confessed their inability to discover the difference between them and the real Italian Leghorn. Mr. Corston states that 781,665 straw hats had been imported from 1794 to 1806, and that for the last five years 5821 lbs. of straw-plat, which was equal to 36,405 hats, had also been brought to this country. By the introduction of his new plait, it was considered that much poor land might be brought into profitable cultivation, and that employment might be afforded for many females and children, usually subsequent communication, dated May, 1810, Mr. Corston states that the country was beginning to reap the benefit of his proposals. (Trans. of the Soc. of Arts, vol. xxi., and v. xx.) For the same purpose Messrs. J. and A. Muir, of Greenock, who attempted to establish the straw-plat manufacture in the Orkneys. These gentlemen communicated the results of their experiments to the forty-four and forty-fifth volumes of the Society of Arts. The manufacture is still followed in the Orkneys. In the fourth volume of the Society's 'Transactions,' which was published in 1823, the defects of British straw-plat were particularly noticed. In plate of split straw, it is laid to the surface, the one part of the fibres being directed towards each other, as in the plait called 'patent Dunstable,' it necessarily happens that the face of the plat exhibits alternately the outer and inner surfaces of the straw, which differ from each other in colour and mode of splitting. This defect was removed by the introduction of a new kind of straw, which, instead of being laid to the surface, was laid to the surface, to those of whole straw of equal fineness, in pliability and durability. Another circumstance which greatly increases the beauty of Leghorn plat is the mode of joining it, so as to form, by the combination of one number of straws, an extended sheet or of platted work. British plat is joined by making the several rows of plat overlap each other a little, and then stitching through the two over-lapping pieces with a needle and thread. The surface of two rows of plat joined in this manner is formed of ridges; and part of each row of plat is concealed by that next above it, so that an unnecessarily large quantity of plat is required to form a given extent of surface. Thus to form a band one inch wide, with a plat quarter of an inch wide, it will be necessary to use five pieces of entire plat; at least a fourth part of the width of each being absorbed by the overlapping joint. Leghorn plat is formed in such a manner that it may be joined without this loss; the edge of one row of plat being, as it were, knitted into the edge of the other, in such a way that the pattern may appear uninterrupted, and the line of junction may be almost invisible. In addition to these differences of quality, it is stated that the cheapness of labour on the Continent gave great advantage to foreign competitors; so much so, indeed, that the best Hertfordshire straw might be, and actually was, sent to Switzerland, platted there, and thence returned to England, paying the import duty of 12s. per lb, and yet sold 25 per cent. more. From this it is evident that these articles were therefore very desirous of promoting such improvements in British straw-plat as might place the manufacture in a more favourable position. With this view they awarded, in 1822, a silver medal and twenty guineas to Mr. Charles Thomas for an improvement in the process of splitting. It appears, however, that this improvement did not appear sufficiently established to be superior to Leghorn straws fineness and colour. Miss Woodhouse sent seeds to the Society, from which the grass was raised in this country; and she also communicated an account of the process of manufacture. (Trans. of the Soc. of Arts, vol. xliii.) Mr. Cobbett communicated to the Society his experiments on native British grasses, of which several appeared likely.
to answer for platting: and some rewards have been since bestowed for experiments of like character. Before noticing these, allusion must be made to another, and a very important paper, in the fourth volume of their 'Transactions.'

The paper alluded to is a communication from Mr. John Parry, who recorded, in 1832, the large order received from the Society for the manufacture of Leghorn plat from straw imported from Italy. The import duty charged upon straw-plant was then, as it still is, considerably less than that upon straw hats or bonnets, and the duty on unmanufactured straw itself still less in proportion. The home manufacture of Italian straw had been tried, but without success, by Mr. Bug; and it was afterwards attempted by Mr. Parry, who, at the date of his communication, had more than seventy women and children employed in it. The ears are, it is stated, cut off with a knife, and the straws are then carefully sorted to obtain uniformity in length, thickness, and colour. The plat of which the formation is described, and of which an engraving is given to illustrate the description, consists of thirteen straws. These are to be tied together at one end, and then divided into two portions; six straws being turned towards the left side, and seven to the right, so that the two portions of straw may form a right angle. The seventh or outermost straw on the right-hand side is then passed down by the fingers of the right hand, and brought under two straws, over two, and under two. This being done, there will be seven straws on the left and six on the right side of the angle; and the next operation is to turn down the outermost of the seven with the left hand, and the third straw is then passed under two straws, over two, and under two. The right side will again have seven, and the left side six straws; and the platting must be continued in the same manner, alternately doubling and platting the outermost straw with straw from side to side, until the portion of straw is drawn so as to cross over so as to double on the other side of the angle. The platter is then to take another straw, and to put it under the short end at the point of the angle (the middle of the plat), and, by another straw coming from under both sides of the angle, the operation of platting, it will become fastened; the short end being then left out underneath the plat, and the newly fastened straw taking its place on that side of the angle to which the short one was directed. The plat thus formed is represented in the cut Fig. 1., taken from the engraving which accompanies Mr. Parry's communication. It is about double the real size. The plat is formed in pieces of great length, which are adjusted in spiral coils, with their adjacent edges knitted together, so as to form the large circular pieces of plat which, under the name of hats, or flats, are so extensively exported from the north of Italy. The mode of effecting the junction is described in the same volume, and may be explained by the help of the annexed cuts. Fig. 2 represents, about four times the real size, the two adjacent edges when knitted together; the dotted lines indicating the edges of each portion of plat, and showing how far the angular folds, or eyes, of one piece are inserted into those of the adjoining piece. The thread by which the two rows of plat are held together is here straight, and is entirely concealed in the plat. The joint is, indeed, only to be detected on either side by the slightly increased thickness of the plat where the angles are inserted into each other, and the thickness of the thread itself. The mode of junction may perhaps be better understood from Fig. 3, which represents the pieces of plat drawn a little nearer, and shows the course of the thread, which is indicated by dotted lines where it is covered by the straw. The operation is performed by pushing a needle through the folds in the required order, and, after passing it through as many as can be conveniently done at once, drawing it through in manner of a bodkin, leaving its place to be taken by the thread. It is observed that if the edges of the plat are not thrust sufficiently close, the needle will miss some of the folds, and the junction, though not visibly imperfect, is really so. It is further stated that sometimes, for the sake of expedition, only every other fold is threaded. This is a very injudicious practice, because it requires a conscious thread to make the junction secure, and therefore, by rendering the line of junction more prominent, impairs the beauty of the work. In arranging the plat in a spiral coil, as in making a hat, it is necessary, in a few places, to force two loops of the smaller circle into one of the larger circle adjoining it, to allow for their different diameters.

The information thus circulated respecting the mode of manufacturing Italian plat, has been of great importance to the British manufacture. In the year after it was published the Society of Arts rewarded sixteen individuals for the production of bonnets formed of grasses indigenous to Britain, platted and joined according to the Italian methods. Several of the specimens produced were even finer than real Leghorn; but it should be remembered that such extreme fineness can only be attained by a sacrifice of strength, and also that it increases the work. Most of them were imperfect in colour and regularity of size; but these defects are not incapable of remedy. The Society reported, that 'Upon the whole it appears to be satisfactorily proved that the stems of the cropped dog's-tail grass are a material for plat finer than the average quality of Leghorn, and that the deficiencies in texture and colour of most of the bonnets produced before the Society are only such as practice and experience will shortly remove.' (Transactions, vol. xli., p. 29.)

Various statements have been made respecting the material commonly used for plat in Tuscany. According to a communication made by Mr. W. Salisbury to the Society of Arts (Transactions, vol. xliii., p. 21), the straw used is that of triticum sereguism, a variety of bearded wheat, which seems to differ in no respect from the spring wheats grown in the vale of Evesham and in other parts of England. It is grown in Tuscany solely for the straw, and not for the grain; and the upper joint of the straw is that chiefly used for platting. Dr. Ure states (Dict. of Arts, vol. iv., p. 1190) that the straw is pulled while the ear is in a soft milky state; the corn having been sown very close, and consequently produced in a thin, short, and dwindled condition. It is then dried by spreading it thinly upon the ground in fine hot weather, and afterwards tied up in bundles and stacked, for the purpose of enabling the heat of the mow to drive off any remaining moisture. 'It is important,' he further says, 'to keep the ends of the straw air-tight, in order to retain the pity, and prevent the gummy particles from passing off by evaporation.' After remaining in the mow for about a month, it is spread out in a meadow, and exposed to the action of dew, sun, and air, in order to bleach it. The straw is frequently turned during this operation; and after it is completed, the lower joint of the straw is pulled off, leaving the upper joint, with the ear attached to it, for use. This part is then subjected to the action of steam, and to fermentation with sulphur, in order to complete the bleaching, after which it is ready for use. It is tied up in bundles, and imported to England in this state.
Bleaching with sulphur is commonly practised in this country, and Dr. Ure states that a solution of chloride of lime may be used for the purpose. The apparatus he describes for the former process consists of a cask open at both ends, with its seams papered. It is to be set upright on the ground, having a hoop nailed to it inside, about six inches beneath the top, to support another hoop with a net stretched across it, upon which the straw is to be laid loosely. The hoops are inserted in the top, and the lid, stuffed with strips of cloth. A brazier of burning charcoal is inserted beneath the cask, and upon this is placed an iron dish containing pieces of brimstone. The brimstone soon fuses, and the sulphurous and gas evolved during the combination with the cask, and bleaches the straw in three or four hours. Care must be taken to prevent the too rapid combustion of the sulphur, which might cause black burned spots on the straw. After bleaching, the straw is to be aired and softened by spreading it upon grass for a night, and it is then ready for splitting.

Straw may be dyed, for ornamental purposes, of many different colours. Dr. Ure states that blue is given by a boiling-hot solution of indigo in sulphuric acid; yellow, by decoction of turmeric; red, by boiling hanks of coarse scarlet in dyeing liquor; brown, by allowing the straw; or, directly, by cochineal, salt of tin, and tartar. Brazil wood and orchil are also employed for dyeing straw. The _spilons_, or pieces of split straw, being curved in a way to prevent its falling apart, require to be flattened between rollers. These, as well as the whole straws used in other kinds of plat, are moistened with water to render them easy to work. It need hardly be observed that cleanliness is indispensable to the beauty of the plat. Hence the Italian manufacturer is the most favourable season for the work, as the plat is not then exposed to the smoky atmosphere of the huts as in winter, nor to the dust and perspiration of the workers. The Italian plat is dressed and polished by passing it forcibly between the hands and a strip of wood. It is necessary to imitate the varieties of straw-plat, of which there are many, differing in the number and mode of platting the straws, in the circumstance of the straws being whole or split, &c.

In the kind of straw-platting above described, the plat is formed into a narrow strip or riband, which must be formed into a spiral coil, or united edge to edge, to form a hat or bonnet. In 1834, Mr. T. B. Smith, of St. Albans, received a prize from the Society of Arts for applying Brazilian plat to the manufacture of hats and bonnets. All the British manufacture of split straw is of this kind. The plat is not formed in strips, but is at once platted or woven into the required form and size. The process is fully explained, and illustrated with cuts, in the fifth volume of the Society's Transactions. One distinct advantage of this method is that either the glossy or the dull surface of the split straw may be placed entirely on one side of the plat.

The British straw-plat district comprises Bedfordshire, Hertfordshire, and Buckinghamshire; these counties being, according to M'Culloch's 'Dictionary,' the most favourable for the production of the wheat-straw commonly used for English plat. The manufacture is also followed, according to the same authority, in a few places in Essex and Suffolk, but very little in other counties. The principal markets are Luton, Dunstable, and St. Albans. In Italy the manufacture is chiefly followed in the neighbourhood of Florence, Pisa, Siena, and the Val d'Arno, in the duchy of Tuscany; and it is also established in Venice and other places. There is a large establishment of English manufacture is purely domestic. The chief market is Florence; and the demand is principally from England, France, Germany, and America. Of late years the demand has fallen off so greatly, that many of the Italian hat manufacturers have abandoned the manufacture. The following tables, compiled from official returns, will show how greatly the imports of straw hats have diminished of late year, especially from Italy; and will also indicate, by the increased imports of straw-plat and straw for platting, the gratifying progress of the British manufacturers, who have made much use of their foreign materials with home labour.

### Table showing the number of straw hat imported, exported, and entered for home consumption, and the net revenue derived therefrom, in each period of five years, from 1820 to 1839:

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Exported</th>
<th>Consumed</th>
<th>Net Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820-4</td>
<td>676,479</td>
<td>42,950</td>
<td>626,236</td>
<td>180,501</td>
</tr>
<tr>
<td>1825-9</td>
<td>3,588,767</td>
<td>70,485</td>
<td>3,518,289</td>
<td>245,537</td>
</tr>
<tr>
<td>1830-4</td>
<td>48,897</td>
<td>174,801</td>
<td>52,685</td>
<td>101,036</td>
</tr>
<tr>
<td>1835-9</td>
<td>83,690</td>
<td>73,824</td>
<td>20,439</td>
<td>6,056</td>
</tr>
</tbody>
</table>

The import duty on straw-platting, during the whole of the above period, was at the rate of 17s. 6d. per lb.

### Table showing the quantities of straw and grass for platting imported, exported, and entered for home consumption, the rate of duty, and the net revenue derived therefrom, from 1820 to 1839:

<table>
<thead>
<tr>
<th>Year</th>
<th>Imported</th>
<th>Exported</th>
<th>Consumed</th>
<th>Rate of Duty</th>
<th>Net Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820-4</td>
<td>9,051</td>
<td></td>
<td>8,497</td>
<td>20 per cent.</td>
<td>7,224</td>
</tr>
<tr>
<td>1825-9</td>
<td>36,855</td>
<td>2,629</td>
<td>31,153</td>
<td>ad valorem</td>
<td>26,476</td>
</tr>
<tr>
<td>1830-4</td>
<td>116,241</td>
<td>10,096</td>
<td>96,145</td>
<td>10 per cent.</td>
<td>74,813</td>
</tr>
<tr>
<td>1835-9</td>
<td>185,759</td>
<td>58,828</td>
<td>126,931</td>
<td>ad valorem</td>
<td>119,056</td>
</tr>
</tbody>
</table>

- The import duty on straw-platting, during the whole of the above period, was at the rate of 17s. 6d. per lb.
- The net revenue derived therefrom, from 1820 to 1839:

**STRAWBERRY.** The English name of the fruit and plant of the Fragaria, a genus of plants belonging to the natural order Rosaceae. The fruit of the Fragaria is one of the most delicious of our summer fruits. The name Fragaria is derived from the Latin _fragum_; and the English name from the practice in this country of cultivating the plant with straw surrounding it.

The genus Fragaria is known in its family by possessing a calyx with a concave tube, the limb of which is 10-parted, and the outer 5 segments accessory; 3 petals; stamens and carpels indefinite, the latter placed upon a fleshy and succulent receptacle, forming the juicy and succulent part of the fruit.

The species are perennial plants, throwing out runners; the leaves are trifoliate, each leaflet being coarsely toothed; the receptacle on the flower is stated to be inflated, or horned, and which is called the fruit, is round, and assumes a variety of colours from a scarcely perceptible pink to a dark red.
Several species of this genus have been described. Linnaeus gave only two; but Widenow admitted eight; and Geo. Don, in 'Millier's Dictionary,' enumerates fourteen. Duchene, who is famous among French botanists, makes an enumeration of twenty species, and makes the species of other writers varieties of these. All of them are natives of temperate or cold climates; and are found in Europe, America, and the mountains of Asia.

As the plants so extensively cultivated as the strawberry, it is frequently difficult to distinguish between the varieties and species, we shall follow Don, and enumerate those species which afford the varieties of cultivated strawberries.

The Alpine strawberry (Fragaria exes) has plicate leaves, pilose beneath; the sepals reflexed, and the hairs on the peduncle pressed down. It is found wild in woods and on hill-sides throughout Europe, and is abundant in Great Britain. Duchene describes eight varieties of this species, each differing by the different form of the fruit or fleshly receptacle. Many of these produce the cultivated varieties which are known in gardens. The F. v. semperflorens produces the red, white, the American, and Danish Alpine strawberry, all of which are of a flat and obovoid form. F. minor produces the red wood-strawberry, or fraiser d'Angleterre, and the white wood-strawberry, both very fine kinds. To the F. v. angellis belongs the red and white Alpine bush-strawberry, but this is a poor fruit at the midst of the season. Hill strawberry (Fragaria collina) has the sepals erect after flowering, and the hairs on the peduncle and calyx erect. This species is native of Switzerland and Germany, and is characterised by its producing green fruit. The strawberries which are called green are the produce of this species. In flavour and size they are only a second-rate strawberry.

The Majaufe of the French (Fragaria Maiaufe) has long stamina, with the calyx pressed down after flowering. This species is greatly valued in France, and produces a fruit which is known in that country under the name of Maiaufe.

Hautbois strawberry (Fragaria elatior) has the sepals reflexed on the peduncle, the hairs on the peduncle and petals extending horizontally. It is a native of North America, and is occasionally found in gardens in the south of England. The shape, size, and colour of the fruit of the hautbois are subject to great varieties, according to its mode of cultivation. It is the parent of a great number of sorts known in gardens, most of which, when properly managed, produce fruits of a first-rate kind. The most common of these are the black, brown, and common hautbois, the globe, the large flat hautbois, the long-fruited muscatella, and Sir John Haughton, all of which belong to this species.

Virginia strawberry (Fragaria virginiana) has the calyx expanded after flowering, the hairs of the peduncle pressed down, and those of the petiole upright. It is a native of Virginia, and to this species belong the great list of sorts of which we are the gardens and known by the name of scarlet and black strawberries. The various kinds of scarlet, globe, cone, and some pine strawberries are produced from this species.

Largelowered strawberry (Fragaria grandiflora) has leaffits glabrous, coriaceous, crenated, glabrous above, and pilose beneath; reflexed sepals, and hairs on the peduncles and petals spreading. It is a native of Surinam, and has furnished our gardens with the sorts called pine strawberries, and sorts named pine, Carolina, Dutch, and others, belong to this species.

Chili strawberry (Fragaria Chiliensis) has leaves obovate obtuse, with silky villi beneath; calyx erect, hairs on the peduncles and petals spreading. It is a native of South America, and is found in Chili and Peru. It is also the parent of a number of mostly inferior strawberries.

The other species of Fragaria do not bear strawberries that are worthy of cultivation. Strawberries, when ripe, may be eaten in almost any quantity without injury. They are heavily eaten mixed with sugar and cream or wine. When ripe and well grown they hardly require such additions; but when their sugar is deficient, this ingredient may be safely added; and the addition of wine under these circumstances should be preferred to cream, as the latter is very liable to disagree with disorders of stomach.

Strawberries may be propagated either by means of their suckers or runners, or by sowing seed. The young plants will generally bear the year after they have been planted or sown. In order to get a large supply of plants, the beds kept should be planted where they have access to abundance of light and air. Plants grown from runners are best for new beds, and should be planted out in March, in beds with three or four rows, leaving an alley between each bed. The alleys should be so wide that the beds kept should be planted cut at least three times in the season. In the autumn the rows should be dug between, and in the spring some straw or dung should be laid between the rows. If the latter produces too luxuriant a growth of the plants, it should be removed. The strawberry is best seen in a light room. The rows of the beds should be two feet apart, the plants eighteen inches saunder, and the alleys three feet wide between each bed. The scarlet strawberries may be treated in the same manner.

As a choice selection of sorts that can be procured for the garden, Mr. Lindley recommends the following:—American Scarlet, Roseberry, Downton, Sweet Cone—all varieties of Fragaria virginiana; Black Prince, Elton's Seedling, Keen's Seedling, Old Pue—varieties of F. grandiflora; Large Fint Hautbois, Profitle Hautbois—varieties of F. elatior; White Alpine—varieties of F. v. elatior; Scarlet, Roseberry, Downton, Sweet Cone—all varieties of F. grandiflora; Alpine strawberry—best grown from seeds, which should not be sown till the spring, and may be planted in March or April, or late in July or the beginning of August, at the base of hedge or walls, in a rich or moist soil. The duration of these and the preceding strawberries is about three years. The Hautbois requires a light soil and the same general treatment; and as they are digestible, care should be taken that there are male plants in the bed in the proportion of about one to ten. The Alpine strawberry is best propagated as it is obtained from the fruit, and should be planted in beds in March, in the same way as the others. The Alpine strawberry is best grown from seeds, which should not be sown till the spring, and may be planted in March or April, or late in July or the beginning of August, at the base of hedge or walls, in a rich or moist soil. The duration of these and the last seed exceeds two years.

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STREPTAXIS, Mr. J. E. Gray's name for a genus of pulmoniferous mollusks, separated from *Helix* on account of the eccentricity of the penultimate whorl.

*Generic Character.*—Shells ovate or oblong; subhemispherical in the young state, deeply umbilicated, and with the whorls rapidly expanding. As the shell becomes complete, the penultimate whorl is bent towards the right and dorsal side of the axis, where the umbilicus becomes compressed, and often nearly closed. Aperture lunulate, border of the outer lip thickened and reflected; a single tooth of the outer lip of the aperture, a high, thin lamella.


STREPTOSPONDYLIUS, H. von Meyer's name for an arrangement of remains belonging to the Cetacean tribe of the Crocodilian order in the arrangement of Professor Owen, who thus defines the vertebral characters of this highly interesting form, the *Steneosaurus rostro-major* of Geoffroy, and the Crocodile of Honfleur of Cuvier:—

*The distinguishing vertebral characters are a back-and-sOCKET articulation of the bodies of the vertebra; but the positions of the ball and cavity are the reverse of those in the existing crocodiles, the convexity being on the anterior part of the vertebra, and the concavity directed backwards.*

In specimens in which the bones are separated from each other, with the body, there is a deep pit behind the costal articular surface; the transverse process rises by four salient ridges, one from each oblique process, and the two inferior and principal ones from the base of the neurophysia; these ridge appears at the under part of the transverse process, so as to include a triangular space, which is deeply concave. This third salient ridge descends from the fore part of the base of the neurophysia to the anterior part of the vertebra, as the posterior of the two last-mentioned ridges, so that the side of each neurophysia appears as if marked with the letter N in high relief. In the cervical and anterior dorsal vertebra there are, instead of a single inferior spinous process, two which terminate each from a little from the base of the neural arch as before described, and the bone, which is depicted and discussed. [Report on British Fossil Reptiles. British Association.]

The Professor states that he is not aware that remains of this Crocodilian genus have hitherto been recognised in any of the British localities; and it is added, that he is not aware of any specimens found in the oolite in the vicinity of Chipping Norton, among which the anterior half of an anterior dorsal vertebra belonging to this animal, and in the collection of Mr. Kingdon of that town, is described as follows:—

*The articular surfaces for the ribs are, as usual, close to the anterior part of the body of the vertebra, and this terminates by a convex articular surface, instead of being, as in the Crocodiles, concave; the second character is the reverse of this, and the side of each articular surface is concave. It is as if a man had pressed his two thumbs forwards and inwards up to the first joint, into the substance of the body of the vertebra, until their extremities had nearly met. The aperture of each pit measures one inch by ten lines. Sufficient of the neurophysial arch is preserved to show the depression which has separated the two anterior ridges of its external surface; but these characteristic ridges, with the transverse spinous and oblique processes, are wanting. The medullary canal is compressed, and gives an oval vertical section one inch six lines high, and one inch six lines wide. Both upper and lower surfaces of the medullary canal are flat, and join the lateral surfaces at nearly a right angle. There is a slight ridge along each side of the transverse process, by which the vertebra is related to the Cetacean genus, and to the *Steneosaurus rostro-major*. This ridge is not as well preserved as in the specimen from Chipping Norton, which extends here outwards and obliquely downwards to above the middle of the costal depression. This depression is vertically oval, with a deeper oblique pit in the middle, two inches in the long diameter, by one inch six lines across the base. The bone is four inches long, and more cellular, except for about two lines at the margin, where it is in very compact lamina. The anterior articular surface of the centrum is slightly and irregularly convex, being nearly flat at the upper part. As a result of this depression from the symmetrical figure in the whole of this vertebral fragment. The body of the vertebra is much compressed in the middle, and suddenly expands to form the terminal articular surface. This character is well preserved in the specimen from Chipping Norton.*

*Professor Owen then notices a posterior dorsal vertebra from the jet-rock (litha shale) near Whitby (much more complete than the preceding specimen, and nearly corresponding in size with the dorsal vertebrae of the Honfleur. The specimen is described by Cuvier of the *Steneosaurus rostro-major* of Mr. Ripleys of Whitby; and informs us that the third British formation in which he has determined the remains of the genus is the Wealden, specimens having been obtained from three localities, viz., Tillage Forest, in Sussex, and Tenby Rock Point and Culver Cliff, in the Isle of Wight. The specimens, he observes, differ in size from those already described, being larger than the *Steneospondylus Cuvieri* from the oolite, and he strongly suspects that they indicate a different species, which he named it *Steneospondylus*. However, as we have seen, that the means of comparison for the satisfactory establishment of the distinction are as yet wanting. Professor Owen also mentions of a cervical vertebra associated, in the Mantellian Collection, with vertebrae of the *Iguanodon* and *Cetosaurus*, which had been destroyed among the fossil crocodiles or crocodiles.* [Occ. Pap. Ed. 1856, 2nd ser. ii. p. 116, et seq.]

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been washed out of the submarine Wealden beds at the south side of the Isle of Wight, and thrown on shore near Culver Cliffs and Brook Point: this specimen is in the museum of Mr. Samuel Colman, of Aldershot, in later London. The idea of the size of this reptile may be derived from Professor Owen's admeasurements, which give 5 inches as the transverse diameter of the posterior concave articular surface in the Wealden, and 6 inches in the Culver Cliff specimen, which the transverse diameter of the body across the inferior process is 6 inches in the Tilgate, and 6 inches 6 lines in the Culver Cliff specimen, the height of the latter from the lower surface of the centrum to the hind part of the base of the spine being 7 inches 9 lines. The observer notes the fragment from the forest marble alluded to in the note p. 297 of Dr. Mantell's 'Geology of the South-east of England' is a centrum from the posterior part of the dorsal region of the Streptospondylus. The foreign localities in which remains of Streptospondylus have been found are the Oxford-clay formation at Honfluer, and the Kimmeridge-clay at Havre (Cuv.); and the lias of Aldorf (H. von Meyer).

We have called the former of this extinct Saurian highly interesting, for it presents those transitional characters which, while they beautifully manifest the passage, so to speak, from one specific form to another, are too apt to lead a superficial observer to wild speculations. Professor Owen, in his leafllet on the subject at the time, saw the subject worthly above quoted, against the transmutation theory—fallacy, we would venture to call it—of Mulelit, Lamarek, and their followers, that if the three forms of extinct Saurians, Ichthyosaurus, Plesiosaurus, and Teleosaurus, whose characters and generic distinction are clearly specified, have the characters of the species and genera specified, and to be referred to genera, which have actually succeeded each other in strata successively superimposed in the order here set forth, some colour of probability might attach itself to this hypothesis, and there would be grounds for searching more closely into the character of the suns, and physical possibilities of such transmutations. These genera however, he observes, appeared contemporaneously on the stage of vital existence; one neither preceded nor came after the other. How the transition then, instead of being gradual, was to be real, not he justly observes, obvious, nor to these other, viz., that the Teleosaur ceases with the oolite, while the Ichthyosaurus and Plesiosaurus continue to co-exist to the deposition of the chalk, and disappear together alike unaltered; the Ichthyosaurus manifesting as little tendency to develop itself into a Plesiosaurus as this to degrade itself into the more flimsy-like form of the Enaliosaurian type.

H. continues the Professor, 'it urged the Streptospondylus, or crocodile with ball-and-socket vertebrae, which are adapted to secondary aquatic life. When the Teleosaur had ceased to exist, might be a modification of the apparently extinct amphichian crocodile, in which the vertebrae had undergone a progressive development analogous to that by which the biconcave joints of the inferior process are actually converted into ball-and-socket joints of those of the mature frog, the facts of both geology and anatomy again oppose themselves to such an hypothesis; for the remains of the Streptospondylus occur likewise in the Whity lia, which is the earliest formation characterized by remains of the Teleosaur; and the modification of the vertebral structure by which the Streptospondylus differs from its antient contemporary, and which it retains unaltered throughout the whole series of the vertebrae, is an approximation to the ball-and-socket structure of modern crocodiles, which first appears in the Mosasaurus and the Eocene crocodiles, but is the very reverse. As reasonably might we infer that the Teleosaur was an intermediate form between the Streptospondylus and the crocodile of the present day, and this became unaltered, and a sub-biconcave type of vertebra had been produced before the posterior ball which characterizes the vertebra of recent crocodiles was finally developed. If the proposals of new species animals had resulted from progressive development and transformation of former species, each class ought now to present its typical characters under their highest recognized conditions of organization; but the review of the characters of fossil reptiles taken in the present day is not the case. None reptile now exists which combines a complete and thorough development with limbs so proportionally large and strong, having such well-developed marrow-bones, and sustaining the weight of the trunk by synchondrosis or ankylosis to so long and complicated a saurian, as in the order Dinosauria. The Megalosaurus and Iguanodonos, rejoicing in these undoubted and progressive characters, have preserved their remains the greatest bulk, and must have possessed the most conspicuous parts in their respective characters as denizens of animals and feeders upon vegetables that this earth has ever witnessed in opulent and cold-blooded creations. They were as superior in organization and in bulk to the crocodiles that preceded them, as to those which came after them.'

There is not the slightest ground for affirming that the pre-Cretaceous gavial of the present day is any respect more highly developed than the opisthocoelous gavial of the oldest lizards. If the differences of vertebral structure in these Crocodilians were contrasted in reference to their relative approximation to the vertebral structure of the higher animals, the resemblance of the ball and socket joint of the vertebral column to those of certain mammals would give precedence in organic perfection to the cranial gavial. If therefore the extinct species, in which the reptilian organization culminated, were on the march of development to a higher type, the Megalosaurus ought to have given origin to the carnivorous mammala, and the herbivorous should have been derived from the Iguanodon. But there is the trace of such mammals in the strata immediately succeeding those in which we lose sight of the reptilian organization; and until the appearance of any mammiferous animal be pointed out whose organization can by any ingenuity or licence of conjecture be derived, without violation of all known anatomical and physiological principles, from transmutation or progressive development of the reptilian type, it cannot be thought that an inspection be bestowed upon the organic relics deposited in the crust of the globe, we learn that the introduction of mammala on that crust is independent of the appearance of the highest forms of reptiles. The small insectivorous mammals and birds do not even undergo a single modification of the Dinosaurian order it has been declining. The Reptilia are now in great part superseded by higher classes. Pterodactylus have given way to birds; Megalosaurs and Iguanodonos to carnivorous and herbivorous mammals; but the ancient extinct reptiles continue a compact appearance of the other, are alike inexplicable on any known natural causes or analogies.

Our limits will not allow us to quote more of this well digested argument, to which we refer those who are interested to see the handsome quarto volume from which these propositions laid down by Professor Owen in the course of the discussion are quoted:

The fossil reptiles, like the fossil fishes, approximate nearest to existing species in the tertiary deposits; and those differ from them most widely in strata whose antiquity is highest.

Not a single species of fossil reptile now lives on the present surface of the globe.

The characters of modern genera cannot be applied to any species of fossil reptile in strata lower than the tertiary formations.

No reptile with vertebra articulated like those of existing species has been discovered below the chalk.

The most interesting of the Ichthyosaurs, the Ichthyosaurus communis did not leave its remains in both oolitic and cretaceous formations; but with this exception no single species of fossil reptile has yet been found that is common to any two great geological formations.

The great fossil ball and socket joints of the vertebrae which are detailed in the body of the Report permits of no other conclusion than that the different species of reptiles were suddenly introduced upon the earth's surface, although it demonstrates a certain systematic regularity in the order of their appearance. Upon the whole they make a progressive approach to the organization of the existing species, yet not by an uninterrupted succession of approximating steps. Neither is the organization one of ascent, for the reptiles have not begun by the type of organization by which at the present day they most closely approach fishes; nor have
they terminated at the opposite extremes, where we know that the reptilian type of structure made the nearest approach to birds and mammals.

'Thus, though a general progression may be discerned, the interruptions and faults, to use a geological phrase, negative the notion that the progression has been the result of slow development; the energies are inadequate to a transmission of specific characters; but on the contrary support the conclusion that modifications of osteological structure which characterise the extinct reptiles were originally impressed upon them at their creation, and have been neither derived from improvement of a lower, nor lost by progressive development into a higher type.'

STRETON. [SUFFOLK.]

STRIGATELLA. [VOLUTID.]

STRIGIDAE. [OWLS, OWL THREAT], the family name for the nocturnal birds of prey, the Egliones of Vieilliot. This natural family have large heads and great projecting eyes directed forwards, and surrounded with a circle or disk (more or less developed according to the nocturnal or comparatively diurnal habits of the species) formed of loose and delicate feathers; a raptorial beak; crooked claws; and a downy plumage, generally spotted, powdered, or barred with different shades of brown and yellow.

Organization.

Mr. Yarrell, in his paper on the Anatomy of Birds of Prey (Zool. Journal, vol. iii.), points out the diminished extent of surface and power in the sternum of the Owls as compared with that of the Peregrine Falcon. [FALCONIDAE, vol. x. p. 163.]

The sternum of Wood Owl, Strix Stridula. [Yarrell.]

And he observes, that from the loose and soft nature of the plumage in these birds, as well as their deficiency in muscle and bone, rapid flight is denied them as useless, if not dangerous, from the state of the atmosphere at the time they are destined to seek their food; but, he adds, they are compensated for this loss, partly by their acute sense of hearing, from an extension of the posterior edge of the cranium forming a conch, coupled with a very large external orifice; and partly by the beautifully serrated exterior edge of the wing primaries, which, allowing them to range without noise through the air, enables them to approach unheard their unsuspecting victim, which falls a prey to the silent flight and piercing eye of an inveterate enemy. He further remarks, that some increase and variation will be found in the strength and form of such of the owls as depart from the type of the true nocturnal bird. In the snowy owl and short-eared owls, which are described as occasionally taking their food by day, the furcula, Mr. Yarrell observes, is stronger and less angular in proportion than in the wood and barn owls. The trachea, he tells us, of the different species of owls so nearly resembles the same part in the falcons, that a separate description is unnecessary, and the same may be said generally of the nasopharynx, stomach, and intestines; the similarity of food would appear to require. Mr. Yarrell found the two cephalic appendages considerably developed in the species of Strix; in the Barn Owl (Strix flammea), as well as in the Short-eared owl, they are, he states, small at their origin, afterwards dilated, and nearly 1.2 inch in length. The crop is large, and the stomach or gizzard is considerably muscular notwithstanding the nature of their living prey.

Brain, Nervous System, and Senses.—The brain is well developed in this family, and the senses of sight, hearing, taste, and smell, especially the last two, are enjoyed in a considerable degree of perfection.

Sight.—Mr. Yarrell observes (loc. cit.) that the external form of the bony ring in the Golden Eagle [FALCONIDAE, vol. x., p. 163] will be found to extend through all the species of every genus of British birds, except the owls, in all of which it is concave. The bony ring of the Snowy Owl has fifteen plates forming the circle, and they are considerably lengthened. The transparent cornea being placed as it were at the end of a tube, is thus, he remarks, carried forward beyond the intervention of the loose and downy feathers of the head.

1. Bony ring of a Snowy Owl. 2. Crystalline lens of the same bird, a, the anterior surface, less convex than the posterior one. [Yarrell.]

It is this position of the eyes, observes the same author, giving a particular fulness and breadth to the head, which has gained for the owl the intellectual character universally awarded to it. The concave facial disk of feathers with which they are surrounded materially aids vision by concentrating the rays of light.

VoL. 1755 of the Physiological series of preparations, is the eye of the Great Horned Owl (Bubo maxima), from which the cornea, humour, and a lateral section of the tunics have been removed, showing the remarkable prolongation of the anterior segment of the eye, which assumes in consequence a tubular form. The horny plates of the sclerotica are coextensive with this segment to maintain its peculiar shape, and to afford a firm basis for the support of a very large and prominent cornea. The marsupium may be observed to be of the proportional size, consisting of seven slightly constricted vessels. The sclerotica, forming the posterior segment of the eye, is very thin. The vitreous and crystalline humours of the eye of the same species are prepared in No. 1749 of the same series, to show that the vitreous humour has a distinct capsule, part of which is reflected from its outer surface. No. 1750 is the crystalline lens of an owl, showing its great convexity adapted to the small distance at which objects are visible to this nocturnal bird at the time when it goes in quest of food. A longitudinal section of the anterior segment of an owl, showing its form and laminated structure, is prepared in No. 1751. No. 1798 shows the eyeball (membrana nictitans) and its muscles, with the external eyelids and Harderian gland.
of the Great Horned Owl. In consequence of the limited motion of the eyeball, arising from its bulk as compared with the orbit, the muscles are of small size. Those of the \textit{membrana nictitans} are, on the contrary, well developed. Bristles are placed in the puncta lachrymalia, and in the duct of the Harderian gland. No. 1799 is the right side of the head of the Horned Owl (\textit{Otus auritus}), showing the three eyelids in situ. The two horizontal are provided with plumose cilia; the third, or oeiitiaty eyelid, is more obliquely placed in the olins than in other birds, and sweeps over the eye downwards as well as outwards, in which motion it is usually accompanied by the upper eyelid. The tarsal cartilage is nevertheless found only in the lower eyelid. A white bristle is passed through the duct of the Harderian gland, and a black one through one of the puncta lachrymalia and the lachrymal duct to the nose. (\textit{Catalogue}, vol. iii.)

**Hearing.**—This sense appears to be very acute in the \textit{Strigidae}—they not only look, but listen for prey. No. 1581 of the same series, in the same museum, is a section of the head of the last-mentioned species, showing the organ of hearing of the right side. The membranous tympani is lodged, in this tribe of birds, at the bottom of a wide but moderately deep external meatus, which is guarded by an inferior fold of integument, and further provided with a well developed auricular circle of feathers, which together fulfill the functions of the external ear. The drum of the ear is very thin and transparent; its vibrations are conveyed to the labyrinth by a single ossiculum, as in reptiles. The membrane closing the former orifice, to which the basis of the columella is attached, the vestibule, and the three semicircular canals, are shown; the two smaller and external canals are laid open where they open into each other in the middle of their course. Bristles are placed in both Eustachian tubes, which communicate together at their nasal terminations, as in the crocodile.

**Smell and Taste.**—These senses appear to be developed nearly as they are in the \textit{Falculidae}. No. 1491 of the series is the diurnal birds of prey. In the eyes, tarsus, and beak of a horned owl injected. The tongue exhibits biliary vascularitv, except at the membranous space intervening between the retroverted papilla on its base and the glottis. The orifices of numerous glands may be observed on each side of the framen lingue. (\textit{Catalogue}, vol. iii.)

**Touch** much the same as in the \textit{Falculidae}. Like their feet the owls are formed for clutching and trussing their prey, in aid of which the external toe of the latter is capable of being directed either forward or backward.

**Systematic Arrangement and Natural History.**

Zoologists are generally agreed in the position assigned to the owls. In Belon and Gesner we find them next to the diurnal birds of prey. In the \textit{Strigidae} the cuckoo indeed intervenes; but the external similitude between that species and the birds of prey accounts for the intervention. In Gesner the Shrikes come between the diurnal and nocturnal predacious birds.

Willughby divides the birds of prey into the diurnal and the nocturnal, placing in the last subdivision of the former the Butcher-Birds and Birds of Paradise. The latter he separates into two sections,—1, the horned or eared; 2, those without ears.

Brisson places the owls in the second section of his third order, which consists of birds with a short and hooked bill. This second section is defined as comprising species the base of whose bill is covered with feathers directed forward.

The genus \textit{Strix} stands among the \textit{Accipitres} in the ‘\textit{Systema Naturae},’ between the genera \textit{Falco} and \textit{Lanius}, which last concludes that order of \textit{Linnæus}.

Latham places the owls at the end of the birds of prey, and so do Latham, Duméril, and Meyer. Illiger, on the contrary, makes the \textit{Nocturni} the first of his order \textit{Raptorae}. Cuvier makes them follow the \textit{Diurnae}; and they immediately precede the \textit{Paseriformes}, among which last the Butcher-birds hold their first place in the first family, \textit{Dentitres}. Vieillot arranges the owls with the family name of \textit{Aegolians}, under his second tribe (\textit{Nocturni}) of his first order \textit{Accipitres}.

M. Temminck places them at the end of his first order (\textit{Rapaces}); and, in his ‘\textit{Manuel}’ of European birds, divides the family of Owls into two divisions,—1st, the \textit{Chouettes}, properly so called; 2nd, the \textit{Chouettes Hiboux}.

The 1st division, or \textit{Chats-huant}, he subdivides into two sections, placing in the first section the \textit{Accipitrine Owls}, or those which see well and pursue the prey by day; and in the second section the \textit{Nocturnal Owls}, which hunt in no light stronger than twilight or moonlight, and conceal themselves during the day.

In the 1st section of the first division M. Temminck places the following species—\textit{Strigès Laponica}, \textit{Nyctea}, \textit{Uralensis}, and \textit{funerea}.

In the second we find \textit{nubialis}, \textit{Aluco}, \textit{fammea}, \textit{passe-rina}, \textit{Tengmalmi}, and \textit{Acadica}.

Under the second division, \textit{Chouettes Hibous}, distinguished by two tufts of feathers situated more or less forward upon the front, and capable of erection (whence their English appellation of Horned Owls) he arranges \textit{Strigès brachyotis}, \textit{Bubo}, \textit{Otus}, and \textit{Scops}.

Mr. Vigors, who makes his first order (\textit{Rapaces}) consist of the families \textit{Vulturidae}, \textit{Falconidae}, \textit{Strigidae}, and \textit{Gypogeneride}, says, in his paper ‘On the Natural Affinities in the Order of Birds in one general classification of existing species—\textit{Strigès lapponica}, \textit{Bubo}, \textit{Otus}, and \textit{Scops}.

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The genus \textit{Surnia}, Dumér., which includes the ‘\textit{Chouettes Eyreerets’} of the \textit{French naturalists}, is the most accipitrine of the group. In addition to the approximation already pointed out, the bill and tail of this genus, more lengthened than those of the \textit{Owls} in general, give it a still stronger resemblance to the \textit{Falculidae}.

The group of \textit{Buzzards} among the latter family appears to come most closely to the \textit{Owls} in their slow and heavy
flight, the softness of their plumage, and their shuf- 117 cottly and cowardly habits. The genus *Circus* of BEETLE in par- ticular, of which our *Hen Harrier* gives a familiar example, may be observed to possess a peculiar elongation and erec- tion of the face-feathers, which bears some resemblance to the disk that encircles the face of the *Strigidae*, and it may therefore be particularised from among those groups, at least, which are most known to us, as exhibiting the nearest approach to *Surnia*.

The same author observes, in the same paper, that when we search among the *Perchers* (Insectesoma) for that point which will denote the semicircular, *Caprimulgus* of LINNAEUS (Goat suckers) a group whose general appearance and habits point out the affinity. *The nocturnal and predatory manners of this genus, the hawking flight, the legs feathered to the talons, the large ears and eyes, the very disk that surrounds the face, the prominent encirca- tion of the external quill feathers, observable in some of the species, the general softness of the plumage, together with its peculiarly striking colour and markings, produce a remarkable similitude between it and *Strix* which has that attracted the eye of the common observer no less than of the naturalist. The provincial names of this genus have generally a reference to this resemblance; while the earlier scientific describers of the different species have for the most part ranked them with the *Caprimulgus* and *Strigidae*. The character observable in some of the species of this family, the serrated nail of the middle toe,* may not be cited as an addi- tional proof of their approach to the birds of prey. The strong talons of the latter are lost in *Caprimulgus*; but a considerable outgrowth of the middle toe (which appears capable of being applied to the purposes of seizure only) preserves, though faintly, the resemblance. May we not almost venture to affirm that this apparently trivial ap- pearance of the subgenera, remote as it may at first sight appear to be, is but a fragment of the distinct character in question?* Nature softens down the extremes of her neighbouring groups, one of those minute and delicate touching by which she marks at once an affinity and deviation. But while we may discern at a glance the general approximation of these groups in the time acknowledged that they stand in need of an intermediate link to give them a closer connection. The weakness of the bill and of the legs and feet of the *Caprimulgus* still keeps it at a distance from the *Ouls*, in which the same members are more competently developed. We may also observe that the bill of this extraordinary genus combines the different forms of that of the two genera, and how far the legs, still main- taining the characteristics of *Caprimulgus*, such as the unusual length of the middle toe, nailing of the claw, and the porous or hollow bill, conform to *Strix*.

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Mr. SWAINSON states that the divisions of the *Strigida* made by modern ornithologists can all be referred to one or other of the following groups:—1, Typical *Ouls*, having the facial disk very large or complete, with large ears and eyes; 2, Horned *Ouls*, fur- nexished with egrets and a large facial disk, but having only small or moderate-sized ears; and 3, *Diurnal or Hawk *Ouls*, where the conch of the ear is comparatively small, and is destitute of an operculum; the head has no egrets, and the facial disk is imperfect or obsolete. The first he considers the typical group; the second, the subtypical; and the third, the aberrant group.

The *Striginae*, or typical *Ouls*, are, Mr. SWAINSON thinks, well represented by the common white species. The head is, he remarks, uncommonly large, and the facial disk of great circumference; the extent of the latter is marked by a dense semicircular https://www.dailysourceofinformation.com/2022/03/11/a-review-of-the-straits-of-singapore/ narrow fringe of feathers, which surrounds the oval opening of collar, with torn ends, lying close upon each other in the manner of scales. The aperture of the ear, which is within this collar, is large, measuring, he says, in the Brown *Oul*, 1.5 inches in length, 1 inch in breadth, and 0.5 inch in depth. The operculum, which is sometimes much larger (as in *Strix flammans*) than the aperture, and sometimes nearly of the same size. He does not however regard these differences as generic. *Ouls* of this group are, he observes, eminently nocturnal, and their geographical distribution, as is usual in all pre-eminent types, is very wide; the white owl, under slight variations of colour, having been found in all the temperate parts of America, in the sultry groves of India, and even in Australia. Without attempting to arrange the genera and species of this group in the order of their natural affinities, he remarks, of great difficulty, he proceeds to enumer- ate such of the subordinate groups as appear to him either to lead to or represent the other genera. He makes it the primary distinction of this group, that the outer and outermost quill feathers of the facial disk, the operculum, and the great development of the ear, should be found in all; hence he includes in it the common long and short-eared *Ouls* of Britain, as aberrant forms of the characters of the *Striginae*. It may perhaps be considered as an arrangement of the characters of the *Striginae*; *Strix cinerea*, with its long tail, holds, in his opinion, an intermediate station between *Strix Tengmalmi*, and *Strix striuliva*, and becomes the type of his sub- generic Scopulae. The same resemblance extends to the tail separating it both from *Striscia* and *Strix*.

Mr. SWAINSON retains the ancient name of *Arto* for the second group, remarking that *Noctua* has already been ap- propriated by LINNAEUS to an extensive group of nocturnal *Ouls* of the mode of locomotion which he place among *Ouls*, furnished with conspicuous egrets above the eyes, and with large disks and ears. The facial disk, in this group, is still large, but it is, he observes, more or less im- perfect, especially above the eyes. This division he considers as containing the egrets and the goatsuckers. Mr. SWAINSON has little doubt, judging from published figures, that all the subgeneric groups exist, but he here notices two only. The great white horned *Oul* (*Heliaptus* Arcticus), in his opinion, evidently intervenes between *Arto* and *Nyctis*. It is, in fact, *Nyctis candida*. "It is, in fact," continues Mr. SWAINSON, "so closely connected with the latter, that, but for its egrets, both would stand in the same genus: the facial disk has now almost entirely disappeared; the head is not much larger in proportion than that of a fox, the shape is less rigid; and the ears are very small. Like the great *Cinereous Owl*, which it seems to represent, its tail, although not much graduated, is longer than usual. Last of all come the little *Scops* and *Otus*, a diminutive group of *Ouls*, of which there are many species. We are dis- posed to believe that these must form a subgenus of them- selves, although we cannot at present detect any very prom- inent character by which they are separated from their congeners. We are therefore driven to differ in our opinion of the *Ouls* above mentioned, by the superior length of their legs, and by the nakedness of their toes. From the hornless passerine *Ouls* of Europe (*Strix Tengmalmi, &c*.), which they seem to represent, they are at once known by the diminished size of their ears, and by their egrets; while, from the corresponding group in South America (*Nyctis*).
they are immediately recognised by the last of these characters. For the present therefore we may retain the group until the whole genus is properly analysed. Several species, apparently belonging to the subgenus Scops, are found in South America, and one in Western Africa. One of the most remarkably horned species is the *Auto supercilius*; and there are several from India which have the ears or legs nearly naked.  

Mr. Swainson then comes to the aberrant group, composed, as usual, of three divisions, which he views as genera. In this group he places *Nyctea*, *Nyctidrya*, *Surnia*, and *Syrnioglaucus*. Mr. Swainson rejects the genera *Noctua*, *Bubo*, and *Ulula*, and still hesitates at admitting *Symyris*, being uncertain whether the brown owl of Europe is really one of the types of the genus *Strix*. On the other hand, he proposes *Scopiopterus*, *Scopiopterus*, and *Nyctipetes*. In the following table the author gives his arrangement of the entire family:—

**Strigidae.—The Owls.**

1. Typical group.—Ears large, operculated, no egrets. *Strix*.  
2. Subtypical.—Ears smaller, no operculum, egrets. *Asio*.  
3. Aberrant.—Head small, claws feathered, tail short. *Nycetae*.  
   Head large, claws naked, tail moderate. *Nyctipetes*.  
   Head small, claws feathered, tail wedged. *Surnia*.  

The same author observes that we know too little of the birds composing these groups to admit of their analogies being traced among other families, at least with precision. Nevertheless, he gives the indications of such analogies; 'Thus,' says he, 'the lengthened and more commodious bill of the barn owl reminds us of the *Comorrostes*; on the other hand the bill of *Auto virginiana* (Virginia) is described by Dr. Richardson as very strongly curved from the base, and with its cutting margin very obliquely lobed in the middle—a structure peculiarly belonging to dentirostral types. The short tail and piscatorial habits of the *Nyctea canis* sufficiently designate the aquatic type. The long-legged burrowing owls obviously represent the grallatorial order of birds and the gilliform quadrupeds; but whether it is the type of *Nyctipetes*, or one of its subgenera, we know not; while in the long-tailed hawk-owls of the genus *Surnia* we trace that great development of tail so conspicuous in raptor types. (Classification of Birds, vol. i.)

The following is the arrangement of the *Synopine* at the end of the second volume of the work:—

**Strigidae.**

*Strix*, *Linn.* (Typical Owls.)  
Subgenera:— *Strix*; *Syrnoglaucus*; *Scoplophus*; *Otia*.  
Asio, *Antig.* (Horned Owls.)  
Subgenera:— *Heliopetes*; *Scops*. (Scops Owls.)  
*Nycetae*, *Sav.* (Eagle Owls.)  
Subgenera not defined. *Nyctipetes*, *Sav.* (Sparrow Owls.)  
Subgenera not defined. *Surnia*, *Dum.* (Hawk Owls.)  
Subgenera not defined.

The Prince of Cymmer, in his Geographical and Comparative List of the Birds of Europe and North America, gives the following arrangement of the—

**Strigidae.**

**Subfam. a. Surnina.**  
*Surnina, Dum.* (Horned Owls); *Nyctea*, *Bonap.*; *Glaucidium*, *Boie*; *Athene*, *Boie* (*Nyctipetes, Sav.*); *Scops*, *Sav.*  
**Subfam. b. Bubonina.**  
*Bubo*, *Cuv.* (*Asio* and *Heliopetes, Sav.*); *Syrnoglaucus*, *Cuv.* (*Scoplophus*, *Sav.*).  
**Subfam. c. Ululina.**  
*Otus*, *Cuv.*; *Brachyotus*, *Gould*; *Ulula*, *Cuv.*; *Nyctale*, *Brehm* (*Scoplophus, Sav.*).  
**Subfam. d. Strigina.**

**Genus, Strix, Linn.**

The *Strigidae* form the third family of the order **Accipitres** in the Prince's method. The *Falconidae* compose his second family of that order. His fourth family, the first in his order **Fasctes**, consists of the **Caprimulgidae**.

*Mr. G. R. Gray makes the Accipitres Noturni the second suborder of his first order **Accipitres**. His third family, the first of that suborder, is formed of the **Strigidae**, which are thus subdivided by him:—*

**Subfam. 1. Surnina.**  
*Surina, Dum.* (*Syrmia, Steph., Strix, Gn.*); *Accipera, Vgl.* *convexa, Cuv.*; *Priz, Whites*; *Scops*; *Nyctea*; *Cuv.*; *Ninox, Bonap.*  
*Athene*, *Boie* (*Nyctipetes, Sav.*; *Strix, Daud.*); *Huhua, Hodgs.*

**Subfam. 2. Bubonina.**  

**Subfam. 3. Ululina.**


**Subfam. 4. Strigina.**

*Strix, Linn.*; *Pholidus, J. Geoff.* (*Strix, Hodgs.*); *Bulaca, Hodgs.*

**Geographical Distribution of the Family.**—Very wide; extending as high as the Polar Sea, where *Strix nyctes* is recorded by E. Sabine as having been seen on the islands in the summer months, and by James Ross as having been observed about the head of Port Fane; it is also found throughout the south, where several pairs had bred in the preceding autumn; and as low at least as Port Famine in the Straits of Magellan (*Strix rufofus, Strix nana, &c., King.*) Species are found in Europe, Asia, Africa, America, and in Australia.  

**Food.**—Birds and quadrupeds, and even fish (in the case of *Strix nyctes* and *Strix flammea*), according to the size of the species. Hares, partridges, grouse, and even the turkey, are attacked by the larger horned owls of Europe and America; while mice, shrews, small birds, snakes, and crabs, are devoured by the smaller *Strigidae*. Mr. Yarrell states that the short-eared owl (*Strix brachyotus*) is the only bird of prey in which he ever found the remains of a bat.  

The species are numerous, and the British Museum contains a very fine collection of them. Our limits will not permit us to do more than notice a very few. The larger horned owls are described in the article *Bubo*.

**EUPHAN OSWS.**

The common white or barn owl (Syrna flammea) claims our first attention, from its typical habit.  

**Description.**—Male.—Upper parts bright yellowish, varied with grey and brown zig-zag lines, and sprinkled with a multitude of small whitish dots; face and throat white; lower parts, some individuals rusty white, sprinkled with small brown dots; in others bright white, marked with small brownish points; in others again without the slightest appearance of spots; feet and toes covered with a very short down, more scanty on the toes; iris yellow. Length about thirteen inches.

In the Female all the tints are brighter, and more developed.  

**Young.**—Covers with a thick white down, and remain long in the nest. Mr. Blyth states that the first set of feathers grows very slowly, and is not moulded till the second autumn.

**Varieties.**—Whitish, or entirely white.  
This is the *Eiffre, Presate, and Petit Chauvment* Plombe of the French; *Burghabean*, *Allone Comme e Bianco*, of the Italians; *Schneizerkauz*, *Furchichterkauz*, and *Peri-Eule* of the Germans; *De Kerkhui of the Netherlands*; *Barn Owl, White Owl*, *Church Owl*, *Ghillihowel*, *Houael*, *Madge Houael*, *Madge Ouel*, *Hising Ouel*, and *Screech* *Ouel* of the modern British; and *Djilau* saws of the antient British.

**Geographical Distribution.**—Very wide, common in England and Ireland, less common in Scotland. Not common in the Orkneys, but present in some of the islands. Found in Denmark, but said not to inhabit Sweden or Norway; generally spread over the whole of Europe, and in Madeira; common in Loraine; extending in Africa from the north to the Cape of Hope Good Hope; met with in India, Japan, and Australia?*  

* * *  

*See post p. 142*.
are, M. Temminck tells us, precisely similar to those of Europe; and those of North America (where it is found in the United States, but does not appear to visit the Fur-countries) differ only in having some slight tints of more sombre hue. Those of South America (the Yellow Owl) are different.

Habits, Food, &c.—Montagu says that this species is never known to hoot. Mr. Yarrell states that it screeches, but does not generally hoot. Sir W. Jardine declares that he shot one in the act of hooting; and, that at night, when not alarmed, hooting is their general cry. It snores and hisses, and, like other owls when annoyed or frightened, snaps its bill loudly. Rats, mice, shrews, young birds, and beetles form their food, and the mice especially suffer when the white owl has a young brood to rear. It has been seen to catch fish. This owl frequents churches, old buildings, and barns, often breeding in the latter, as well as in hollow trees near farmyards and villages. The nest is but a rough one, and the female lays three or four white eggs more oval than those of the brown or ival owl, and not so large. Young have been found so late as July, September, and even December. Mr. Blyth, in the Field Naturalists' Magazine (vol. iv.), throws some light upon this. 'A nest of the barn owl, last summer,' says he, 'in this neighbourhood (Tooting) contained two eggs, and when these were hatched two more were laid, which latter were probably hatched by the warmth of the young birds; a third laying took place, after the latter were hatched, and the nest at last contained six young owls of three different ages, which were all roared.' Mr. Yarrell states that he has frequently been told by boys in the country, that they had found eggs and young birds at the same time in this bird's nest. The food is generally swallowed whole, and the bones and fur of feathers rejected in pellets called castings, as indeed is generally the case with this family. In captivity the Barn-Owl is sociable with other birds, but will sometimes, like the dogs, hide what remains of its meat.

Strix flammea.

Surnia Uralensis. Description.—Face whitish, tail much graduated, much longer than the wings; all the plumage striped with large longitudinal spots and streaks.

Old of Both Sexes.—Head of considerable size, face very large, well feathered, marked with some blackish hairs; a large circle of white feathers spotted with brownish black, takes its origin on the forehead and frames in the whole face; top of the head, nape, back, and wing-coverts marked with great longitudinal spots, which are disposed on whitish ground; throat, front of the neck, and all the lower parts whitish, marked on the middle of each feather with a large longitudinal brown stripe; quills and tail-feathers banded with brown and dirty white alternately; seven of these bands may be counted on the tail; black yellow nearly hidden in the long hairs of the face; iris brown.

tarsi and toes covered with white hairs marked with small brown points; claws very long, yellowish. Length of tail ten inches and some lines; total length about two feet.

Young of the Year.—All the ground-colour of the plumage bright brownish-grey; the spots and stripes on all the lower parts ash-brown; upper parts irregularly spotted with ash-brown and light red, and variegated with oval white spots; wings and tail transversely banded with grey, the seven bands of the tail whitish ash.

This is the Strix Uralensis of Pallas; Strix histrionia, Retz; Strix macroura, Natterer; Strix macrocephala, Meissner; La Chouette des Monte-Urals, Sonnnini; Ural Owl, Latham; Die Ural Habichtseule, Bechstein; Habichte-seule, Naumann; Uralischer und Grosskopfiger Baumhahse, Brehm.

Geographical Distribution.—Arctic regions of the Old World, Lapland, North of Sweden, Norway and Russia, Livonia and Hungary, and Japan. Very rare in the eastern parts of Germany; very accidentally found elsewhere. Mr. Gould regards it as one of the rarest European Owls.

Habits, Food, &c.—Leverets, rats, mice, ptarmigan, and small birds. The nest is formed in the holes of trees, often near the habitations of man. Mr. Gould states that the number of eggs is two; M. Temminck says three or four; they are pure white.

Surnia funerea. Description.—Male.—Forehead dotted with white and brown; a black band takes its origin behind the eyes, includes the orifices of the ears as in a frame, and terminates on the sides of the neck; upper parts marked with brown and white spots of various forms; on the borders of the wings are similar white spots disposed on a brown ground; throat whitish; the other lower parts white, transversely striped with ash brown; at the insertion of the wings a great spot of blackish brown; tail-feathers ash-brown striped at considerable distances with transversal narrow zigzags; bill yellow variegated with black spots according to age; iris bright yellow; feet feathered to the claws. Length of tail six inches and some lines. Total length upwards of fourteen inches (Tomm.); Richardson says eighteen inches.
The colours of the female are less pure than those of the male, and she is rather larger.

This is the Strix Uulua, Linn.; Strix funerea, Gmel.; Fort.; Strix Hudaonia, Gmel.; Strix Canadensis et Preti Hudsonia, Briss.; Strix Hudsonia, Wils.; Strix nitoria, Meyer; Chouette de Canada and Chouette Epeirothre, ou Capraocaroth, and Chouette á longue queue de Siberie. Buffon: (Bal. 468, a very good figure of this species, under the erroneous name of the Ural Mountains Owl); Chouette Epeirothr, Sonn.; Sporibereule, Meyer; Naum.; Habichts-eule, Bechst.; Platteköpfge and Hochköpfge Habichts-eule, Brehm; Hawk-Owl of Pennant and Wilson; Little Hawk-Owl of Edwards; Canada Owl of Latham; Parote therocauve, or Cobadecootch of the Cree Indians; Thesechaza of the Copper Indians and Chepewyans; and Ood no hero of the Esquimaux.

Geographical Distribution. — The Arctic Circle and Arctic regions of both continents; sometimes seen as a bird of passage in Germany, more rarely in France, but never in the southern provinces. In Britain it does not appear to have been seen; but one was taken in a collier a few miles off the coast of Cornwall in 1839.

Habits, Food, &c. — The visual organs of this species are more able to bear the light of day, at least in dull weather, and, like the Snowy Owl, it hunts frequently in the daytime. The smaller head and less perfect facial disk, combined with these habits, have obtained for it the name of Hawk-Owl.

Profilo of Hawk-Owl.

Dr. Richardson says that: "It remains all the winter in high northern latitudes, and is rarely seen so far south as Pennsylvania, and then only in severe winters. Wilson saw only two specimens in the United States. It is a common species throughout the Fur-countries from Hudson’s Bay to the Pacific, and is more frequently killed than any other by the hunters, which may be partly attributed to its boldness and its habit of flying about by day. In the summer season it feeds principally on mice and insects; but in the snow-clad regions, which it frequents in winter, neither of these are to be procured, and it then preys mostly on ptarmigan. It is a constant attendant on the flocks of ptarmigans in their spring migrations to the northward. It builds its nest on a tree, of sticks, grass, and feathers, and lays two white eggs. When the hunters are shooting grouse, the bird is occasionally attracted by the report of the gun, and is often held enough, on a bird being killed, to pounce down upon it, though it may be unable, from its size, to carry it off. It is also known to hover round the fires made by the natives at night." (Fauna Boreali-Americana.)

Surnia nucya. Description. — Head small in proportion, brown and black, the former alone indicated by a slight plumage snow-white, but more or less variegated with transverse brown spots or stripes; the younger the bird, or the larger and more numerous are these spots and stripes. Very old individuals are pure white, with a few brown spots; the fine not appearing until they feel very well covered, so as to look almost woolly to the claws; tail round, not much exceeding in length the extremity of the wings. Length 24 or 25 inches. Female considerably larger than the male.

Young at the time of departure from the nest. — Cored with brown down; the first feathers bright brown.

This is the Strix nucya of Forster, Latram, and Gmelin: Strix candida of Latham; Strix nucya of Daudin; Chouette de Capesterre of Buffon; Chouette Blanche de Le Valle, Aruco Diurmo of Stor. deul. Ucc.; Schneekauz of Bechstein; Snowuil of Sepp; Nordicher Schneekauz and Snow Eule of Brehm; Ermine Owl and Snowy Owl of Latham; Great White Owl of Edwards; Snow Owl of Wilson; Apache Keethi or Wapato of the Cree Indians; and Oogpeegwak of the Esquimaux.

Geographical Distribution. — Arctic regions of the Old and New World, Iceland, Sweden, Norway, Lapland, and the north of Europe generally. The Shetland Isles possess it, but, some think, in winter only. In the Orkneys it appears to be accidental. It has been shot in Scotland, England, and Ireland, and has been occasionally seen in Germany: in Holland a young bird was seen in the winter of 1802. It does not seem to have been reported by any one in the Orkneys. Richardson states that it frequents in summer the most arctic lands that have been visited, but retires with the ptarmigan, on which it preys, to more sheltered districts in the winter. 'Even in the latter season however,' says that author in continuation, 'it is frequently seen within the confines of the Arctic Circle; though it is not very common at the same period in Canada and the northern parts of the United States; and now and then it has been known to wander as far south as Florida. . . . It hunts in the day; and indeed unless it could do so, it could not pass the summer within the Arctic Circle. When I have seen it on the barren grounds, it was generally squatting on the earth, and if put up, it alighted again after a short flight: but it was always so wary as to be approached with great difficulty. In the woody districts it shows less jealousy, and, according to Hearne, has been known to watch the grouse-shooters a whole day for the purpose of sharing in the spoils. On such occasions it perches on a high tree, and when a bird is shot, skims down, and carries it off before the sportsman can get near it. It preys on lemmings, hares, and birds, particularly the willow-grouse and ptarmigan. Mr. Hutchins says that it eats carrion; and Wilson informs us that it is a dexterous fisher, grasping its finny prey with an instantaneous stroke of the foot as it sails along near the surface of the water or sits on a stone in a shallow stream. I have seen it pursue an American hare on the wing, making repeated strokes at the animal with its foot; but on that occasion, through the intervention of an Indian, it was driven from its quarry. It makes its nest on the ground, and lays three or four white eggs, of which two only are in general hatched. In winter, when this owl is fat, the Indians and white residents in the Fur-countries esteem it to be good eating. Its flesh is delicately white. (Fauna Boreali-Americana.) M. Temminck states that it builds its nest on scoured rocks, or on the old pines of the glacial regions; and that it lays two eggs, marked with black spots, according to M. Vieillot, but white, according to all other naturalists. William Bullock appears to have been the only person who recognised this species as a British bird during his visit to the Orkneys and Shetlands in the summer of 1812. He states that one, wounded on the Isle of Balta, disgorged a
young rabbit whole; and that one in his possession when he wrote, had in its sandpiper a sandpiper with its feathers entire.

N.B. The large white owl of Africa is nowhere considered to be identical with this species.

Specimens in different stages of plumage are generally to be seen in the garden of the Zoological Society in the Regent's Park.

The following are also European species:—Bubo maxilis*, Bubo Aculatus, Otus vulgaris*, Otus brachyotos*, Scoo Aldrovandi, Surnia ciceria, Uliia Nebulosa, Syrniun Aluco*, Noctua nudipes* (Gould—Strix nudipes, Auct. and Frasseti, Tengmalms, and Noctua Fassorina* (Gould—Strix Fassorina).

Those marked * are in the Catalogue of British Birds. Mr. Yarrell gives Strix passerina and Noctua nudipes, Gould, as synonyms.

ASIAN OWLS.

Example. Strix badius, Hors.

Description.—General colour of the upper parts of the head, back, wings, and tail, chestnut-brown; with a bright fulvous lustre irregularly diffused over it, showing itself more strongly in particular angles; on the under parts, from the neck to the vent, the brown colour is greatly diluted, and the fulvous lustre alternates with patches of Isabella yellow. All the parts dotted with brown; ornamental collar round the neck, consisting of a compound series of white spots, elongated in form. This species was first described in 1824.

Our limits will only permit us to notice, in addition to the species above recorded, which are common in Europe and America, the well-known burrowing little owl (Noctua cucullata). Mr. Darwin states that this species, on the plains of Buenos Ayres, exclusively inhabits the holes of the bizacha or visacha [Chinchillidea, vol. vii., p. 88]; but that in Banda Oriental it is its own workman.

During the opening season of the year, Mr. Yarrell says this acute observer, 'these birds may be seen in every direction, standing frequently by pairs on the hillocks, near their burrows. If disturbed, they either enter the hole, or, remaining a short distance from it, make a remarkable undulatory flight to a short distance, and then turning round, steadily gaze at their pursuer.' Occasionally in the evening they may be heard hooting. I found in the stomachs of two which I opened, the remains of mice, and I one day saw a small snake killed and carried away. It is said these latter animals are their common prey during the daytime. I may here mention, as showing on what various kinds of food owls subsist, that a species that was killed among the islets of the Chonos Archipelago had its stomach full of the feathers of the Macrel (Gobius), of The Journal of Researches in Geology and Natural History.)

AUSTRALIAN OWLS.

Mr. Vigors and Dr. Horsfield, in their Description of the Australian Birds in the Collection of the London Society (Linn. Trans., vol. xi.), record three species of owls belonging to the genera Noctua and Strix.

Example. Noctua Boobook.

Description.—Brown above, with a few yellowish-white spots; white beneath, varied with ferruginous spots; toes hairy.

This is the Strix Boobook, Boobook Owl of Latham.

According to Mr. Horsfield, "the native name of this bird is Back-back. It may be heard nearly every night during winter uttering a cry corresponding with that word. Although this cry is known to every one, yet the bird itself is known but to few; and it cost me considerable time and Vol. XXI.—B
trouble before I could satisfy myself respecting its identity. The note of the bird is somewhat similar to that of the European cuckoo, and the colonists have given it hence that name. The lower order of the settlers in New South Wales are led away by the idea that everything is the reverse in that country to what it is in England; and the cuckoo, as they call this bird, surprising by night, is one of the instances which they point out.

*Noctua maculata* described by the same authors, much resembles the species just noticed, but they are inclined to consider it distinct.

**Strix.**

Example, *Strix flammula*.

Mr. Vigors and Dr. Horsfield observe that this bird varies from our European species in the buff colour being consi-
ciderably darker, and the spots on the abdomen being larger and more deeply marked than is usual in our own. They add however that in our species there is considerable variety; and as they had an opportunity of examining a single speci-
men only from New Holland, and that in an inferior con-
tion, they did not wish to state with any confidence an
opinion as to the identity of these birds.

**Fossil Owls.**

Remains of fossil owls have been found in the gypsum of the Curtis and Paris limestone portions of the tertiary series. Boccones (of Lyell) in company with extinct species of extinct genera of *Fuchidermata*, and extinct species belonging to existing genera of Carnivora, Marsupulata, Rodentia, and of other birds referrible to the Buzzard, Quail, Woodcock, Shrike, Heron, etc., as belonging to the section of Birds, (freshwater tortoises and crocodiles). Two kinds of owl belonging to existing species occur in the gypsum cavities at Kostritz, together with sheep or roe, fox, weasel, squirrel, field-mouse, common rat, hamster, bat, mole, hare, rabbit, frog, domestic cock, and snakes. (fresh-water tortoises and crocodiles). The upper and lower form. If from the ground level, the trunk a little longer than its own, and the ground level, the trunk a little shorter than its own, it is always at right angles to the strike, so that in conical or elliptical elevations of strata the strike becomes continually more inclining in direction, so that in general, the strike is daily from the surface of the earth, by which the head of the animal passes when it extends itself. The greater part have, he adds, this sinus at some distance from the crown.

Cuvier nearly follows Lamarck in the subdivisions of the genus. Of the Strombus, properly so called, he says, that the external border or lip divided in the adult into long and slender digitations, varying in number according to the species. The animal is the same as in the *Strombus* properly so called.

**The Rostellarium,** he remarks, have, in general, a second canal running along the spine and formed by the ex-
central border or lip divided into long and slender digitations, varying in number according to the species. The animal is the same as in the *Strombus* properly so called.

The following additional character is given, which, in his arrangement, stand between the Turbinel-
idae and the Bivalvia.

"One lip divided, or thickened internally, or detached from the preceding whorl by a sinus; operculum small."

He makes the family consist of the following sub-

1. *Strombina.*

**Subfam. Character.**—Outer lip considerably divided; but never toothed; spire rarely longer than the aperture, with a sinus near the base.

General. *Aphorrites, Da Costa* (*Aphorrites,* we suppose,
Subfamily. — Cylindrelleen.

Subfamily. — Strombus. — Shell small; outer lip considerably thickened within, where the margin is invariably either toothed or spined; shell thick, the margin generally thickened; inner lip with a toothed edge, internally and externally; aperture narrow, generally slender; operculum minute.

Genera. — Conidea, Sw.; Columbella, Lam.; Pasticotea, Sw.; Crassipatra, Sw.; Nilidella, Sw.

4. Pleurotominae.

Subfamily. — Pteroceras. - Shell thickened, subovate; the base channelled, and often much produced; outer lip never thickened, but detached at the top from the whorl by a slit or sinus.

Genera. — Brachytoma, Sw.; Pleurotoma, Lam.; Clavata, Sw.; Clavitaunha, Sw.; Tomella, Sw.

5. Cerithinae.

Subfamily. — Shell elevate, generally mucronate; the spine very long; the outer lip considerably dilated; the base either truncate or forming a short recurved channel.

Genera. — Potomis, Brong.; Penna, Lam.; Terebilla, Sw.; Rhinoclavis, Sw.; Cerithium, Lam.

Mr. J. E. Gray makes the Strombekei (the first family of his section Ctenobranchiata, Order 1, Zoophaga) include the following genera: Strombus, Terebellum, Pteroceras, Rotallaria, and Seraphy.

In this article the Strombidae will be confined to the genera Strombus, Pteroceras, and Rotallaria.

Strombus.

Generic Character. — Animal spiral, slightly compressed, furnished with a proboscis, at the extremity of which is the mouth opening longitudinally, and containing a lingual riband furnished with sharp points curved backwards; tentacles cylindrical, obtuse, and short; eyes placed upon two peduncles, which are cylindrical and stout, longer than the tentacles, and placed at their external side; foot rather small, but enlarged forward; mantle forming in front a canal, which is generally rather short; orifices of the anus and oviput behind.

Shell thick, oval, oblong, subinvoluted, conical in front and behind; spine moderately elevated; aperture long and narrow, terminated anteriorly by a canal more or less long or removed; right lip dilated, and with a sinus a little behind the canal; columellar or inner lip simple, but sometimes ciliated.

Operculum horny, long and narrow, with a terminal summit, and composed of elements imbricated, as it were. (Rang.)

M. Rang considers that the variations in the shell lead to the establishment of two subgenera, Strombus and Pteroceras.

M. de Blainville divides the genus Strombus into the following sections:

a. Species whose external lip becomes much dilated with age, and offers a number of digitations variable in number. (Genus Pteroceras, Lam.)

Example, Strombus Scrupus.

3. Species whose right lip is much dilated, but without digitation.

Example, Strombus tricornis.

7. Species whose external lip is thick, and but little or not at all dilated.

Example, Strombus Latissima.

2. Species whose right lip is not dilated, and very delicate, which makes them resemble the Cones. (Non-adult Strombli.)

Animal of Strombus lambis; Pteroceras lambis of modern authors (female). a, the foot seen in its anterior part with its groove; b, the operculum fixed at its posterior division; c, e, ciliated tubes with their tentacles; d, the proboscis open to show the larger; e, the ciliated branchial tube, in which are two long siphonae; f, the digestive tube entering the large stomach; g, the stomach (with its valves opened), and showing the order of the gizzard; h, the intestine becomes dilated before it forms the very subovate rectum; i, the first part of the stomach; j, second part of the stomach, forming a sort of pouch in the extremity of the stomach; k and l, pyloric and intestinal branches; m, the heart; n, the liver and the ovary united to the extremity of the kidney, or tubular part of the body. (Poupeau of the Strombidae.)

See the generic character above given for the animal.

Shell with a simple wing, and a very short canal, which is truncated or notched.

Operculum. — See the generic character above stated.

The species are extremely numerous, and many of them are gigantic in size, the well-known Strombus Gigas of the West Indies for example. Like some others of the turbinate testacea, the animals of the genus Strombus occasionally produce pearls. Mr. Wood, in his 'Zoophylogy,' relates that he saw a pink pearl which was taken from the body of the animal of Strombus Gigas, which is fished for the table off the island of Barbadoes. The pearl was discovered by chance, while the men were employed in cleaning the fish. Its weight was 24 grains, but it would have been more valuable if it had been round. The same author states that only four of these pearls had been discovered in the vast numbers of shell-fish that are annually brought to market, and have probably in their hurry returned many a pearl to its native element with the refuse of the animal. This pearl was exactly of the same colour as the interior coat of the shell, and like it in every respect except in figure.

Geographical Distribution of the Genus, Habitat, &c.— The seas of warm climates; many from those of India, and some from those under and near the equator. Carnivorous. Species have been found at depths varying from 0 to 13 fathoms.

M. Deshayes, in his Tables, makes the number of recent Strombus forty-five. M. de Blainville reckons them at fifty-two; of these Strombus Gigas is noted as found both recent and fossil (tertiary).

Example, Strombus Latissima.

Description. — Shell turbinate, ventricose, smooth on the...
back, somewhat wrinkled on the wing, brown orange spotted with white; the spire short and nodulous; the external lip very broad, rounded above, projecting beyond the spire, the anterior margin sharp, but the side of it very thick; the aperture smooth and white, tinged with rose colour.

Locality.—East Indian Seas.

This fine and somewhat rare species grows to a large size, from five to ten or more inches in length.

Stronbula latitans.

We have selected this species because it is one of those that leads to the next subgenus.

Pteroceras.

Animal.—See the generic character above stated, and the cut and description of the animal, p. 123.

Shell with the wing digitated, and furnished forwards with an elongated canal.

Operculum.—See the generic character above.

Geographical Distribution of the Genus, Habits, &c.—The Indian seas. Carnivorous. Pteroceras have as yet been only noticed as littoral.

The Pteroceras are very much less numerous than the Strombi. M. Deshayes, in his Tables, makes their number seven; no fossils.

Example, Pteroceras Scorpius.

Description.—Shell ovate-oblong, gibbous, tuberculate; transversely rugose and knotty, seven fingered, white.

Pteroceras Scorpius.

spotted with rufous, the fingers rather slender, and knotted at intervals throughout their length, the anterior ones and the tail the longest, and curved; aperture violaceous-red wrinkled with white.

Locality.—East Indian Seas.

Rostellaria.

This genus is placed between Pterotoma and Fusus among his Siphonostomatæ by M. de Blainville. M. Rang arranges it between Pterotoma and Strombus. Cuvier places it under the latter genus.

Generic Character.—Animal imperfectly known, but bearing a considerable resemblance to that of Murex, according to Cuvier.

Shell fusiform or subturriculate, with an elevated pointed spire; aperture oval, canal projecting, and terminating in a pointed beak; external lip simple, dentated, digitated, or very much dilated, furnished with a sinus near the canal, and having generally a second canal ascending upon part of the spire.

Geographical Distribution of the Genus, Habits, &c.—The Asiatic Seas, if we except Rostellaria Pes Pelaeoni and Pes Carboni (genus Aporrhais), which are found in the Mediterranean and other European seas. A very fine specimen of Rostellaria rectirostris was brought up in the mud lying on the fluke of an Indianman's anchor, in the Straits of Macassar. Carnivorous.

The number of recent species enumerated by M. Deshayes in his Tables is seven recent, and, of these, three, Rostellaria Pes Pelaeoni, Pes Carboni, and a new species, are noted as being found both living and fossil (tertiary).

M. de Blainville thus divides the genus:—

a Species whose external lip is digitated.

Example, Rostellaria curvirostris.

b Species whose external lip is dilated and not dentated.

Example, Rostellaria Macrotera (genus Hippochroence of De Montfort—fossil).

Rostellaria curvirostris (Strombus fusus, Linn.), the Spindle of collectors, is by far the most common of the Asiatic species. We illustrate the genus by Rostellaria rectirostris, Lam., a name which suits this rare species well when the beak is curtailed, as it most frequently is. In a very fine specimen, as far as the beak is concerned, now in the British Museum, that usually mutilated part is much longer and better preserved than it is generally seen, and from its recurvature the name of recurvirostris would be more apt. Indeed it is by no means clear that there are
not two species of this long-beaked kind of Rostellaria, one much darker than the other, and not so slender.

Description.—Shell fusiform—turreted, smooth in the middle, squalid white; the whorls rather convex, the last transversely sulcated below, the upper more convex and cancellated; external lip toothed on the margin; beak very long, slender, very straight.

Such is Lamarck's description; but those unfaded specimens which we have seen have been of different hues of brown, and those above described show an elegantly turned canal or volute upon the bottom whorl of the spire, a, b in the subjoined cut. Some specimens that we have seen have been of a deep brown, approaching to black in the inside of the outer lip. In the young shells the external lip is not developed. Lamarck gives the length of the adult as 4 inches; 10 lines, but the shell above noticed as being in the British Museum, and which has the longest beak we ever saw in the species, is of much greater length. The shell is called by collectors the Chinese Spindle.

Fossil STRO'NTIUM.

Lamarck records but one fossil species, Str. Canalis (Grignon). M. de Blainville remarks that when he wrote (1825) only five species of true Strombi had been found fossil, one of which, from the Plaisiant, is an analogue, according to Broebei.

M. Deshayes, in his Tables, makes the number of fossil Strombi (tertiary) nine, Str. Gigas being, as already stated, both recent and fossil.

Rostellaria

Lamarck records the following fossil species:—Rostellaria macroptera (Strombus ambiguus, Brand; Hypochnere macroptera, Mont.), from St. Germain-en-Laye; Rostellaria columbata, from the same locality, and Rostellaria fissurea, from Grignon and Courtignon.

Defrance notices fifteen fossil species; one identical from the Plaisiant, and an analogue from Grignon.

M. Deshayes, in his Tables, records the number of fossil (tertiary) Rostellaria as eight; three species, as above stated, being both recent and fossil.

(Central Europe) Geology describes and names two species, Rostellaria Lamarckii and Cuvieri, from the Claiborne Beds, Alabama (tertiary).

Dr. Mantell (Organic Remains of the County of Sussex) records Rostellaria Sowerbyi from the arenaceous limestone or sandstone of Bognor; and Rostellaria Parkinsoni, calcarea, and a species 'with two processes' very closely resembling R. Pez. Pelicani (genus Aporrhait of some authors), from the Shanklin sand.

Pocock Phillips (Remains of the Yorkshire Coast) notes Rostellaria Parkinsoni from the Speeton Clay; composita, from the Bath and inferior oolite; bipinnata from the calc. grit and Kellywolds rock; and trifida from the Oxford clay.

Dr. Seeligk and Mr. Marchison (Structure of the Eastern Alps) record Rostellaria costata, granulata, and longicosta from the Gosau deposit and its equivalents in the Alps.

Dr. Fiton (Strata below the Chalk) gives the following species in his well digested Stratigraphical and Local table: Rostellaria buccinoides, from the gault, Kent; calcarea from the gault, Kent, the lower green-sand of Sussex, Isle of Wight, and Norfolk, and from Blackdown; carinata, from the gault of Kent, Surrey, and South Wits; elongata, from the gault of Kent; macrostroma from Blackdown; Parkinsoni, from the gault of Kent, the lower green-sand of Sussex and the Isle of Wight, and from Blackdown; retusa from Blackdown; double from the lower green-sand of Kent; very like Pez. Pelicani from the lower green-sand of Sussex; and a new species from Blackdown.

ST'RO'MBOLI. [LIPARI ISLANDS.]

STROM'HO'LM. CANAL OF. [SWEDEN.]

STROM'NESS. [ORKNEY ISLANDS.]

STROM'NITE. [ORKNEY ISLANDS.]

STRO'NSTED. [SWEDEN.]

STRO'NTIUM, a peculiar metal found in combination with oxygen and carbonic or sulphuric acid, and forming the carbonate and sulphate of strontia. From the very considerable resemblance existing between barytes and strontia they were once supposed to be identical. Crawford and Salisbury noticed a difference between them, and in the year 1792 Dr. Hope established sufficient differences to prove that they were completely distinct bodies, and the newly discovered body was named Strontia or Strontites, from Strontian in Scotland, the place in which it was discovered.

Strontium was procured from the carbonate of strontia by Davy in 1808; the method adopted is that which we have described for obtaining barium [BARIUM] from the carbonate of barytes. Its properties have been but imperfectly examined; it has not a very high luster, is heavier than sulphuric acid, appeared fixed, difficultly fusible, and not volatile. When exposed to the air it attracted oxygen, and became converted into strontia; when thrown into water, it decomposes it with great violence, producing hydroglaugos and forming with the water a solution of strontia.

Oxygen and Strontium, as just mentioned, readily unite, constituting the protoxide, or strontia, which exists largely in nature, and the peroxyde, which is entirely an artificial product. The simplest mode of procuring the protoxide, or strontia, when required to be free from water, is to dissolve the native carbonate in nitric acid, and to decompose the crystallized nitrate obtained at a red heat; or the sulphate of strontia, which is a much more common substance, may be converted by the well known means first into sulphate and then into nitrate. The properties of strontia are, that it has a greyish-white colour; its specific gravity is between 3 and 4; it is very insubflable, not volatile, has an acid taste, and acts upon alkaline solutions to form coloured solutions. On comparing these properties with those of barytes, it will be observed that there is considerable resemblance between them, but they differ in one remarkable respect, namely, that strontia, unlike barytes, is not poisonous. When exposed to the air it attracts carbonic acid, and is converted to the state of carbonate.

Strontia is composed of—

One equivalent of oxygen 
One equivalent of strontium

Equivalent . . . . . 8
Equivalent . . . . . 44

Strontia and Water combine to form at least two compounds when a small quantity of water is poured upon strontia, it shatters, gives out heat, is rendered white, and becoming a base, it is fusible at a white heat, but does not part with its water.

It consists of—

One equivalent of water . . . . . 9
One equivalent of strontia

Equivalent . . . . . 61

According to Davy, strontia is soluble in about two hundred times its weight of water at common temperatures. The solution is very powerful to oxygen gas, and occasionally employed as a chemical reagent; it acts energetically as an alkali on vegetable colours and in saturating acids. In boiling water strontia is much more soluble than in cold. As the solution cools, crystals, the primary form of which is a solid square prism, are deposited, and these appear to consist of—

Ten equivalents of water . . . . . 90
One equivalent of strontia . . . . . 52

Equivalent . . . . . 142

Peroxide of Strontium may probably be obtained, as the peroxyde of barytes, by passing oxygen gas over strontia at a red heat, or by heating it with chlorite of potash. It is a white powder, which appears to consist of a compound of oxygen and one of strontia, but is not an important compound.

Neither azote nor hydrogen unites with strontium.

Chlorine and Strontium combine to form only one compound, consisting of—

One equivalent of chlorine . . . . . 36
One equivalent of strontium . . . . . 44

Equivalent . . . . . 80

The best mode of procuring this salt is to dissolve carbonate of strontia in dilute hydrochloric acid, and to evaporate the solution to its crystallizing point, the chloride containing water then separates in long slender crystals, which consist of 1 equivalent of chloride 80 + 1 equivalent of water 9. When the water is expelled, and the white chloride remains. The crystals dissolve in a moist atmosphere, are soluble in twice their weight of
It's sulphate, soluble colourless.

Fluoride of Strontium is an insoluble pulvulant compound.

**Sulphate of Strontium** may be formed either by heating the native sulphate with charcoal, or by fusing strontia and sulphur in a green glass tube. It dissolves in hot water, and as the solution cools crystals of sulphate of strontium are formed. They appear to contain water, independently of which they probably consist of—

| Equivalent | 9
| One equivalent of sulphur | 16
| One equivalent of strontium | 44

**Equivalent**

This compound is used for the preparation of the salts of strontia, the sulphate being a much more common substance than the carbonate, which is preferable however when obtainable.

We shall now describe three oxisalts of strontia, two of which exist in nature, and the third is occasionally employed in chemical researches.

**Carbonate of Strontia**-Strontianite. This was the first discovered compound of strontia; it occurs crystallized and massive. Primary form a right rhomboide prism. Cleavage parallel to the faces of the crystal. Fracture uneven. Hardness, scratches carbonate of lime, but is scratched by flour-spar. Colour white, vitreous. Transparent, translucent. Structure columnar, fibrous, granular.

It is not acted upon by acids. Before the blow-pipe it depreetates and fuses into a white friable enamel. The powder becomes phosphorescent on a hot iron.

According to Klaproth it consists of—

- Sulphuric acid
- Strontia

**Equivalent**

This substance occurs near Bristol, in Sicily, at Bex in Switzerland, &c.

**Sulphate of Strontia and Barites : Graniterite.**-This mineral occurs preferably in Hanover. It occurs massive, its structure is radiated. Hardness 3 to 3½. Colour white, with sometimes a shade of blue. Translucent. Lustrous vitreous. Specific gravity 3.76.

**Sulphate of Strontia** may be obtained artificially, by adding sulphuric acid, or a sulphate, to any soluble salt of strontia. It is a colourless, insipid, heavy powder, insoluble in water, and dissolved only by strong sulphuric acid, from which it is precipitated by water. It is composed of—

| Equivalent | 92
| One equivalent of sulphuric acid | 40
| One equivalent of strontia | 52

**Equivalent**

It crystallizes in octohedrons, is soluble in five parts of water at 60°, and in half a part at 212°. It is insoluble in alcohol, but when finely powdered and mixed with it, the solution is rendered a beautiful red, and by evaporation yields crystals, which are composed of—

| Equivalent | 106
| One equivalent of nitric acid | 54
| One equivalent of strontia | 52

**Equivalent**

The salts of strontia are occasionally used in chemical investigations, and in giving a purple flame to fire-works.

**STROPHÉ** \( \left( \text{στρόφη} \right) \) is a set of verses composed according to a certain system of metres. The word is derived from \( \text{στρέφω} \) 'to turn,' as in the lyric, especially the choral poetry of the Greeks, this part of a poem was sung during the movements and changes of the choruses. When such a combination of verses, written either in the same or in different metres, is commonly designated by the Italian name stanza. The division of a poem into strophes was however applied by the ancients only to lyric poetry, and here one strophe corresponds generally to a single verse. In modern times such a combination of verses is composed, written either in the same or different metres.

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STROPHULUS is an eruption of pimples upon the skin, which frequently occurs in infants whose health is disturbed by the irritation of teething or any other cause. Dr. Willis describes the following forms of it:

1. S. intertinctus, of which the vulgar name is red-gum or redbrown. The eruption in this form consists of vivid-red distinct papules, scattered in varying numbers over the cheeks, the forehead, the hands, or in some cases, the whole body. After a certain duration the papules disappear, the cuticle separating in scurf; but very frequently the fading of one eruption is followed by the appearance of another, which passes through similar stages and generally spreads over the body. In the case of the papule in each eruption sometimes assumes the character of small pustules, a little fluid being formed in their apices; but this commonly disappears without bursting. The origin of the eruption may usually be traced to disorder of the digestive organs, and more rarely from a diseased condition of the skin, but may be cured. A sudden resumption of it by exposure to the cold, or any injurious remedies, may bring on diarrhoea, and even severe general illness. In itself it is a disease of no importance.

2. S. auritus differs from the preceding only in the colour of the papule, which consist of minute whitish specks, slightly elevated, and usually surrounded by a pale ring of red. They appear in the same situations as those of the first variety, are referrible to a similar origin, and require no other treatment.

3. S. confertus is often called the tooth-rash, and the rank red-gum. It occurs only during the process of teething, and consists (in children of three or four months old) of small, red, round papules, less elevated than those in S. intertinctus. Their usual seat is on the cheeks and sides of the nose; sometimes they extend to the forehead and the arms, and sometimes large papules appear upon the loins. If the eruption occurs when the infant is eight or nine months old, it generally assumes a severer form, one or two extensive patches appear on the arms, shoulder, or neck, the papules in each being hard, large, and set so closely, that the whole surface of the skin seems bright red. These usually continue for a fortnight, spreading slowly, and generally giving rise to pustules on the back, the eruption at this time being limited to the part, after the exfoliation of the cuticle, rough and discoloured for a week or two longer. Similar, but more obstinate and painful form of eruption, sometimes appears on the lower extremities and the lower part of the trunk. It is never advisable however to adopt any active treatment for the remedy of this variety of the disease. It commonly continues during the whole of the early period of dentition; but it affords in some measure a safeguard against more serious disorders, and disappears soon after the first teeth have broken through.

4. The S. vacaticus is characterised by small circular clusters of from six to twelve bright-red papules, which break out successively in many different parts of the body, remaining about a week, and then disappear, leaving in their stead a small circular scar. The complaint generally lasts three or four weeks, and passes in successive eruptions over a considerable part of the body. It is attended by slight fever and general disturbance of the system, and is most common in children of from three to six months old.

5. S. candidus is distinguished by the papules being larger than in any other variety. Their surfaces are smooth and shining: and, their bases not being inflamed, they seem partly hollowed out. They appear in the eastern end of the country, and are followed by a week, and disappear in the same manner as those in the preceding forms. An eruption of this kind is most common in children a year old, who have shortly before its appearance suffered from some acute disease. It requires no active treatment, however to adopt any active treatment for the remedy of it. It ceases with the irritation from which it has its origin.

STROUD, a parliamentary borough in Gloucestershire. It includes an extensive district, comprehending the parishes of Stroud, Bisley, Painswick, Pickettch, Randwick, Stonehouse, Longtrees, and Whitestone; its greatest length is about 10 miles, and the breadth from north to south, and nearly the same distance from east and west; its area and population, according to the returns of 1831, were as follows:—

<table>
<thead>
<tr>
<th>Parish</th>
<th>Acres</th>
<th>Inhabitants</th>
<th>Houses</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroud</td>
<td>1974</td>
<td>1746</td>
<td>163</td>
<td>8600</td>
</tr>
<tr>
<td>Bisley</td>
<td>790</td>
<td>1264</td>
<td>116</td>
<td>3594</td>
</tr>
<tr>
<td>Painswick</td>
<td>6510</td>
<td>837</td>
<td>118</td>
<td>886</td>
</tr>
<tr>
<td>Dodson and Longtrees</td>
<td>500</td>
<td>43</td>
<td>4</td>
<td>224</td>
</tr>
<tr>
<td>Pitchcomb</td>
<td>4650</td>
<td>500</td>
<td>45</td>
<td>507</td>
</tr>
<tr>
<td>Minchinhampton</td>
<td>4800</td>
<td>116</td>
<td>153</td>
<td>5114</td>
</tr>
<tr>
<td>Rodborough</td>
<td>1390</td>
<td>417</td>
<td>61</td>
<td>2141</td>
</tr>
<tr>
<td>Woodchester</td>
<td>1180</td>
<td>187</td>
<td>23</td>
<td>885</td>
</tr>
<tr>
<td>Horsley</td>
<td>4480</td>
<td>799</td>
<td>125</td>
<td>3639</td>
</tr>
<tr>
<td>King's Stanley</td>
<td>1470</td>
<td>464</td>
<td>55</td>
<td>514</td>
</tr>
<tr>
<td>Leonard</td>
<td>910</td>
<td>189</td>
<td>12</td>
<td>942</td>
</tr>
<tr>
<td>Stonehouse</td>
<td>2260</td>
<td>516</td>
<td>17</td>
<td>2469</td>
</tr>
<tr>
<td>Randwick</td>
<td>1260</td>
<td>203</td>
<td>39</td>
<td>1031</td>
</tr>
</tbody>
</table>

Total: 41740 8290 929 64 8616 39932

From this it is to be seen that the detached part of the parish of Leonard Stanley, which is excluded from the borough, but is not distinguished from the rest of the parish in the Population Returns. It has an area of about 300 acres. In the Report of the Parliamentary Boundary Commissioners, it was proposed to include the parish of Eastington, but the Boundary Act did not include it. It adjoins the eastern extremity of the county.

The borough of Stroud comprehends an important part of the west of Gloucestershire, clothing district, drained by the branches of the Stroudwater, which joins the Severn between Gloucester and Berkeley; ‘the peculiar features of the district are, the situation of the mills on streams in deep ravines; the scattered and irregular manner in which the houses are built, many of them having been constructed on the small olive soils; and the contrast between the high land (in many cases either wood or common, with few inhabitants) and the valleys studded with houses and thickly peopled.’ (Boundary Commissioners' Report.)

It comprehends the market-towns of Stroud, Minchinhampton, and Painswick. Stroud, which gives name to the borough, is 111 miles west by north of the General Post-office, London, viz. 81 miles by the Great Western Railway to Swindon, 18 miles by branch to Cirencester, and 12 miles from Cirencester to Stonehouse; distance by the direct road through Minchinhampton, Blenheim, Painswick, Stonehouse, Minchinhampton, and Cirencester is 165 miles. Stroud is 94 miles south of Gloucester. Minchinhampton is 4 miles south-east of Stroud; and Painswick about the same distance.

Stroud stands in a picturesque valley at the junction of two of the streams which form the Stroudwater (sometimes called the Frome), a stream celebrated as possessing superior excellence for the dyeing of scarlet cloth. This quality led to this district being early chosen by clothiers and dyers.

The town has been greatly improved in modern times; the streets are paved, and contain many good houses. The church is a large building of various dates; it consists of a nave, chancel, and side aisles, with a tower and spire at the north-west end. It is a parliamentary church, capable of accommodating 1000 persons; and there are places of worship for Baptists, Independents, and Wesleyan Methodists. The market, which is on Friday, is well supplied, and there are two yearly cattle-fairs. It is one of the poorest of the large towns, but it is the wealthiest of the county.

Petticoat sessions for the division are held here. The living of Stroud is a perpetual curacy, of the clear yearly value of 132l.

Minchinhampton and Painswick, as well as the village of Bisley, are described elsewhere. (GLOUCESTERSHIRE.)

Randwick is a village one mile south-west of Stroud. The church, formerly a chapel to Minchinhampton, has a tower with pinnacles; and a nave, chancel, and south transept; amidst many alterations, some ancient features remain. (RICKET.) The Independents have a place of worship. Nailsworth is a chapel, partly in Avening and partly in Horley parish. The village of Nailsworth is about
two miles south-west of Minchinhampton, and extends into Minchinhampton parish. It has several dissenting meeting-houses. A customary market is held on Saturday. Horsley is about two miles south-west of Minchinhampton, and about one and a half miles south of Stroud.

It has a church and two dissenting meeting-houses, a national school, and a small house of correction. Petty-sessions for the district of Longtree are held in turn at Horsley, Rodborough, and Totbury, the last being the most remote. It has also a lock on the canal. Knole, about two miles south of Longtree, has some antiquities, as the remains of a Roman camp, and of a residence of the Mercian kings. Several Roman altars and other antiquities were dug up about two miles from the camp. Lechlade, about one mile south-east of Stroud, has some remains of a priory of Benedictines, dedicated to St. Leonard.

The conventual church, now parochial, is partly of early English architecture. The convent kitchen is used as a dance-room, and part of the cloister is in use as a playroom. It is now a scattered and irregular village, but has a considerable share in the clothing manufacture. Stonehouse, four miles west of Stroud, has an ancient church which retains many of its ancient features, though much modernised: the north door is Norman. Wendover and two miles south-west of Stroud, was probably a Roman station. Interesting remains of a Roman villa have been discovered here, especially a large tessellated pavement, 48 feet 10 inches square, very richly and elaborately ornamented, and far superior to anything found in Gloucestershire.

The number of persons engaged in manufactures, almost entirely of woollen cloth, in 1831, was 2439. The Stroud canal, or Stroudwater navigation, passes through the borough.

It commences at Pimbridge, near Framilode, between Gloucester and Berkeley, and runs eastward eight miles to Wallbridge, near Stroud, where it joins the Thames and Severn Canal, which runs by Stroud. 30 miles eastward to the Thames at Chippenham. The Stroudwater navigation was formerly two miles west of Stroud, and the Severn and Thames under acts passed from 1793 to 1813.

All the parishes in the borough are in the archdeaconry of Gloucester and diocese of Gloucester and Bristol; and all, we believe, except Petchcombe, in the rural deanery of Stroud. The town is in the hundred of Wotton, in the county of Gloucestershire.

The parishes comprehended in the borough (including the detached part of Leonard Stanley, which we have no means of distinguishing) had, in 1833, eighty-seven day-schools of all kinds, with 2345 scholars, viz. 1904 boys, 970 girls, and 371 children of not distinguished sex: of these day-schools were also Sunday-schools, and were attended on Sunday by 480 children. There were forty-four Sunday-schools, beside the six just mentioned, with 6132 scholars and 1543 teachers.

The borough returns two members to parliament: the number of electors on the register in 1835-56 was 1295; in 1835-40 it was 1292. (Parliamentary Papers.)

STROUD. [Rochester.]

Stratified family of Florence, of the period of the republic, which produced many distinguished men both in learning and politics. The Strozzi are mentioned in the beginning of the fourteenth century by the chronicler Dino Compagni as belonging to the Guelfi and Nerher party, of which they became one of the leading families. After the revolt of the lower orders, in 1378, was suppressed, Tommaso Strozzi joined Salvestro de' Medici, Benedicto Alberti, and Giorgio Scial, in supporting the popular government against the burgh aristocracy at the head of which were the Albizzi and some of the Strozzi themselves; who, on suspicion of a conspiracy against the existing government, were seized in 1379, and summarily put to death. A fresh insurrection, in 1381, upset both Tommaso Strozzi and Giorgio Scial, Strozzi escaped, but Scial was beheaded. Tommaso Strozzi retired to Mantua, whither a branch of the Strozzi was thus transplanted.

In the following century the most conspicuous of the family was Palla Strozzi, who filled several high offices: he was at least twice present at the surrender of Florence, and afterwards employed on several missions: he was sent, together with Cosmo de' Medici, to the congress of Ferrara in 1422, when peace was concluded between the duke of Milan on one side, and Florence and Venice on the other, through the mediation of the Nicholas of Cusa. Shortly after this a civil strife broke out between the rival families of the Medici and the Albizzi, and Palla Strozzi joined the party of the latter. The Medici, from the time of Giovanni, father of Cosmo, had taken the popular side, especially in the business of the catastro or census, by which taxation upon property was fixed in proportion to the value of each estate. This was strenuously opposed by the grandi, or other wealthy families, who, having had hitherto the government in their hands, had never paid their proper share of the public burdens, which fell chiefly on the inferior citizens. The Albizzi, who were at the head of the Medici, were, however, ruled by the Medici and Albizzi, and put in prison. He was charged with sundry misdemeanours; among others, with having, together with his friends, their machinations and intrigues, caused the republic to undertake an impolitic war against Lucca, which had nearly proved the ruin of the state. (Palla was a member of the Comitì della Jeufoniera, and the majority of the signori or executive, elected from among their friends. Cosmo de' Medici, of the Medici family, and also for St. Leonard.)

Strozzi, near Stroud, and a few miles south-west of Stroud, has some remains of a priory of Benedictines, dedicated to St. Leonard. The conventual church, now parochial, is partly of early English architecture. The convent kitchen is used as a dance-room, and part of the cloister is in use as a playroom. It is now a scattered and irregular village, but has a considerable share in the clothing manufacture. Stonehouse, four miles west of Stroud, has an ancient church which retains many of its ancient features, though much modernised: the north door is Norman. Wendover and two miles south-west of Stroud, was probably a Roman station. Interesting remains of a Roman villa have been discovered here, especially a large tessellated pavement, 48 feet 10 inches square, very richly and elaborately ornamented, and far superior to anything found in Gloucestershire.

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had purchased many books, and had engaged amanuenses to transcribe others for the purpose, when the unfortunate civil factions of 1434-35, and his own exile, prevented the execution of this work. The son of a distinguished senator, Flavio Strozzi, and of one of the most celebrated families of Florence, was born. His name was Filippo, and his family called him Filippo Crispi. He was the second son of the family, the eldest being Ippolito, a noted poet and prose writer.

A colophon of the Strozzi family, which lived at Ferrara in the 15th century, was Nanni or Giovanni Strozzi, a Florentine, who removed to Ferrara, and became a distinguished captain in the service of the Marquis of Este. His name, Nicholas of Este, was ennobled, and acquired considerable wealth. Nanni left four sons, all of whom applied to literature; but the most distinguished of them was Tito Vespasiano Strozzi, who studied under Guarino da Verona, and became a distinguished scholar and Latin poet. Some of his "Carminis" were published by Aldus Manutius, and they contain his own biographies; others are still inedited. Tito Vespasiano filled several judicial and administrative offices at Ferrara. He was appointed by the duke president of the Council of the Indies, and a Florentine ambassador to the Council of Five Hundred. As an administrator he appears to have been a contemporary writer, and a short poet of his age. The mode of his death was not fully ascertained, but it is said that he perished at the same hour that he was returning home, and his body was found on the road with twenty-two stabs, and wrapped up in his mantle. Giovio says that a person of high rank, whom he does not name, was through jealousy the author of the murder. The Duke Alfonso of Ferrara was suspected. Some of the Latin elegies of Erode Strozzi resemble those of Ovid in ease and pathos, and in one of them he applies himself to the same church as his father. His widow, who was also a poet, wrote a sonnet on his death, which is in the "Raccolta dei Poeti Ferraresi."

Of the main stock of the Strozzi family which remained at Florence, the most celebrated was Filippo Strozzi, who figured at the period of the fall of the republic. Filippo acted an ambitious part; he was ambitious, and had great influence through his connections and his great wealth, being possessed of large funds in various banking-houses in several countries of Europe. He was at times friendly and at others the rival of the Medici. He married Clarice, daughter of Piero de' Medici and niece of Leo X., a haughty but ambitious woman, who ill brooked to see two illegitimate sons of the late Alessandro and Cardinal Ippolito placed by Pope Clement VII. to rule over Florence. Filippo and his wife were the instigators of the popular movement of May, 1527, in which the republic was restored and the two young Medici were reduced to a private condition. Filippo was consul when his marriage was anathematized by the Medici, and of the moderate party, in opposition to the violent men who wished to proscribe all the friends of the Medici, and drive matters to extremities. In 1529, by the treaty of Barcelona, between Charles, the Emperor, and Leo X., Filippo Strozzi agreed to make Alfonso de' Medici the spurious and even dubious son of Lorenzo, duke of Urbino, son of Piero, duke of the Florentine state, and Charles V. agreed to give him in marriage his natural daughter Margaret. An army of mixed Imperialists and Strozzi, under Pietro Strozzi, brother of Filippo, was obliged to surrender, after an obstinate resistance, in which several members of the Strozzi family distinguished themselves, in August, 1530, and Lorenzo Strozzi, brother of Filippo, was one of the commissioners who signed the capitulation on the part of the Florentines. Filippo, who was then at Rome, took part in the various conferences held there by the friends of the Medici in the presence of the Emperor, the Pope, and the Medici themselves. The son of Filippo Strozzi was Filippo Strozzi, at the court of Alexander. Filippo Strozzi returned to Florence and appeared to be on good terms with the new duke, to whom he had lent money to build a citadel to overawe the city. But Strozzi and his family were too wealthy and too ambitious to be long subjects; and he was assassinated. The cause of his death was despicable. The sons of Filippo were fiery and restive, and his daughter Luisa, who had married Luigi Capponi, having been publicly insulted by one of the duke's courtiers, the latter was assailed and quickly handled by some unknown men. Her brothers were arrested, but afterwards liberated by an order from Pope Clement. The unfortunate Luisa died soon after of poison. In the year 1535, when Charles V. landed at Naples on his return from the Tunis expedition, Filippo Strozzi and other Florence nobles were removed before the eyes of the tyrannical and despotical conduct of Duke Alessandro, who repaired to Naples with his counsellor Giuicciardini, in order to answer their charges. Filippo Strozzi offered large sums of money to the Pope to obtain the removal of Duke Alessandro. At last the emperor declared that the duke should remain, but should give a complete amnesty to the political emigrants, who however resolutely refused the boon, and dispersed themselves among various towns of Italy, Florence being especially repulsed.

In 1537 Duke Alessandro was murdered by his relative Lorenzo de' Medici, who was a descendant of Lorenzo, the brother of Cosmo the elder; upon which the partisans of the Medici contrived to have young Cosmo, another descendant of the house of Medici, sent as an envoy to Spain. This was done with the approbation of Charles V. The Florentine emigrants were now reduced to despair, and being excited by the agents of France and of Pope Paul III., they resolved to try once more the chance of arms. Filippo Strozzi repaired to Bologna, with his son Piero, a young but rash and cowardly youth, who had served in the French armies, and with Baccio Valori, Anton Francesco degli Albizzi, Prior Salti, and others; from thence they made an irruption into the Florentine territory, and made a descent on the city of Montemurlo, situated between Prato and Pistoia, allowed themselves to be surprised by the soldiery of Cosimo joined by some Spanish troops, and were compelled to fly and to be pursued and routed. Piero Strozzi was lucky enough to escape, but Filippo and the other leaders were taken and carried to Florence, where most of them were immediately beheaded. Filippo Strozzi was imprisoned in the very fortress which his money had helped to raise. He was there kept as a prisoner of the emperor, under the care of his lieutenant Don Juan de Luna. Charles V., although he hated Filippo Strozzi and all his family as enemies and partisans of France, was well advised to make this gesture, for it would have been impossible to hold the court without him. When Pope Paul and other great personages interceded for him; Duke Cosimo however was eager for his death. The emperor told the pope that he would spare him if he could show that he was innocent of the murder of Duke Alessandro. Filippo Strozzi was at the same time advised to come to Florence, and it appears certain that he had no previous understanding with Lorenzino: he was astonished and for a time incredulous when the latter told him what he had done, but when he was convinced, he made a compurgation to the Pope, and asked for his pardon, and extolled him as another Brutus. However Filippo Strozzi was examined, and put to the torture in presence of Cosimo's chancellor and of Don Juan de Luna; but although he suffered cruelly, being of a weak and sensitive frame, he did not make a confession. He was imprisoned in the fortress of Luna at last ordered the torture to cease. Duke Cosimo however seized upon Giuliano Gondi, an intimate friend of Filippo, who, being under the torture, said that he had heard from Filippo that he was privy to the murder. The
depositions were sent to the emperor, who ordered Don Juan de Luna to deliver his prisoner into the hands of Cosmo. Filippo, being informed of this, preferred killing himself to being put to death by the executioner. He wrote a declaration of his motives, inscribed 'Deo Liberatis,' in which he said that after having been already sentenced to death, and without waiting for its consummation through the violence of renewed torments, to accuse some of his innocent relations and friends, as had lately been the case with the unfortunate Giuliano Gondi, he had determined to put an end to his life. He had therefore given the soul to God, begging of his mercy to give him at least a place at the feet of Cato of Utica and other virtuous men who had died in a like manner. He then requested his sons to fulfill his testament, and to repay Don Juan de Luna, the Spanish vassal of the Venetian republic, for the little he had already paid him. Cosmo, to whose side he had granted liberty, and in whose house he had been, begged his body to be buried in Santa Maria Novella by the side of his wife, if it should be permitted; otherwise it might be where they would put it. And lastly, addressing the emperor, he entreated him to inform himself better concerning the affairs of poor Florence, and to provide better than he had hitherto done for its welfare, unless he intended to ruin the city altogether. He signed this remarkable paper, which was found in his bosom after his death, 'Philippus Strozzi jamnum mortiturus,' and added an epigraph from Virgil:

"Eccor saepe nostris ex ostiis ulnis."
Sopatonia to the church of Rome. (Tiraboschi; Pignotti; Fontanini.)

The palace Strozzi at Florence, built by the architects Da Majoano and Pilloiaglio, in the time of the republic, is a re-
movable specimen of the graceful architecture of the middle ages. After the lapse of nearly four centuries it appears as perfect as if it were a recent structure. The colossal entablature which crowns the building is much admired.

Struensee and Brandt have acquired celebrity from their extraordinary rise to rank and power, and still more so from their common fate. Their names are inseparably blended in history, and the life of the one can be understood only in connexion with that of the other.

John Frederick Count Struensee was born at Halle in Saxony, on the 5th August, 1737. His father, a divine of some eminence, respected alike for his good qualities and for the orthodoxy of his principles, was professor of theology at the university of Halle, and his mother was the only daughter of John Samuel Karl, physician in ordinary to the king of Denmark. Both his parents took great pains in educating young Struensee, who, after the ordinary course of study, graduated at school attached to the orphan-house of Dr. Franke, entered the university in 1754, and applied himself to physic. The extraordinary talents which he possessed, and the facility with which he acquired everything bearing upon the science he had chosen, were strongly counter-
balanced by his eccentricity in his new circle of friends. His opinions on matters of religion. Being however under the control of his father, he obtained, with some distinction, his degree of doctor in medicine in 1757. In the same year his father was made pastor primarius at the principal church of Altona, where he devoted the power of his influence to the advancement of public Physician. Singular success attended him in the practice of his profession, and shortly after his arrival a few literary productions procured him the reputation of an able author. His health, however, after a long illness, was so precarious that in 1758, when he had been appointed superintendent-general of Sleswig and Holstein, it is to Struensee's stay in Altona that we must ascribe his knowledge of politics, little as it was, which he so ably employed after his arrival at Copenhagen. Here he laid the foundation of that pernicious system of licen-
tiousness which was at once the stimulus of his ambition and the cause of his ruin. It does not appear when he left Altona; but in 1758 we find him appointed to attend the king of Denmark, Christian VII., in his tour through Germany, France, and England. Struensee soon insinuated himself into the good graces of the king, with whose profili-
gacy the loose principles and easy manners of his new play-
ners were well calculated to win him. The imprudent youth he gained over his royal master, that, shortly after his introduction to him, he ventured to promise Brandt, whose acquaintance he made at Paris, to use his influence in order to procure his recall from banishment. About the same time who afterwards filled so conspicuous a part in the revolution which involved his ruin. At Paris a frequent intercourse with D'Alembert and Vol-
taire confirmed him in his infidelity, while the profili-
gacy of the higher ranks gave exemption from the fear of scandal. We must not omit that it was during this journey of Chris-
tian VII. that the degree of D.C.L. was conferred on the king by the university of Oxford, and that of M.D. on Struensee. Soon after their return to Copenhagen the king himself deigned to appoint Struensee to the queen Caroline Matilda, the illegitimate daughter of Frederic, Prince of Wales, and sister of George III., and promoted him to the rank of privy counsellor. It appears however that the queen did not receive this new favour of her husband with any marks of attention. It was only through the address with which Stru-
ensee reconciled her with the king, from whom she had been alienated in consequence of his excesses, that he be-
came as acceptable to her as to his husband, and every day from both of them new marks of consideration and favour. In 1770, having inoculated the crown-
prince (Frederic VI., born in 1769), he was entrusted with his physical education. In his capacity of lecturer to the king, Struensee found ample opportunity of extending his influence. But when the discontented Count Bernstorff, or ambitious pretender, was in the way of obtaining him his seat in the council of state, he recommended Count Rantzau-Aschbach. Soon afterwards he obtained the recall of his friend Enuwold von Bredow, who was raised to the dignity of master of the plays and director of the plays, instead of the old favourite Count von Holk. Brandt's polished manners, his easy address, and his lively conversation, were qualities well calculated to promote his favour with the court, where it was of the greatest importance to Struensee that none of his friends should have any influence. It was chiefly through Brandt that he finally succeeded in dismissing Count Bern-
storf from the service; many other men of quality were obliged to leave their situations, and the queen dowager of England, Maria Carolina, whose behaviour was not devoid of sin by her friends, and slighted by her enemies. The triumph of Queen Caroline was complete; the king behaved to her with deference, and Struensee was now constituted first minister with a commission similar to that of the time. Thus matters stood at the end of 1770, when of the two persons striving for the power which the king had almost resigned, that of the young queen under the guidance of Struensee obtained a decisive victory. In order to be in perfect security, Struensee assigned to Brandt the special office of watching the king and preventing him from having any conference with his ministers.

It was about this time that the king, urged by Struensee, dissolved the council of state, and instituted in its place a commission of conference (Commissarische konferenzen), which consisted of the presidents of the several branches of public administration. This measure brought all the power into the hands of the prime minister, by whom the members of the commission were appointed. The commission, at the same time the whole Danish constitution by denuding the nobility of their hereditary influence in the affairs of the government, created a universal feeling of disapprobation, and brought much popular odium on Struensee. So limited was the new change that it seemed but a semblance at certain times, and might be dismissed by the minister; in fact, its members had neither rank, power, nor influence. The impudence with which this measure was carried into effect could not but prejudice the queen's cause. Among the many enemies which it created, few were so exasperated as Count Rantzau, who, with his seat in the council of state, lost all his power and authority. In order to revenge himself, he joined the queen dowager at Frederiksborg. Struensee, who had not been less impoverished by the revolution, was too much at the mercy of the queen, who had however the desired effect. Struensee's authority be-
came paramount, and no one ventured to oppose him. The ministers were removed one after the other. All affairs were carried on under the immediate direction of Struensee, and all papers passed through his hands before their ratifi-
cation by the king. He soon found however that notwithstanding his qualifications for managing the foreign affairs of the kingdom, he had no present means of restoring the greatness of the home administration, and that which had long been declining under the administration of persons utterly devoid of prudence and unacquainted with the resources of the country. His brother C. A. Struensee, privy-treasurer, a member of the privy council, in an attempt to make limited improvements; but the taxes which he imposed produced great dissatisfaction among the lower classes, a circum-
stance which, joined to the despotism exercised over them by a foreigner, increased the number of malcontents and the dissatisfaction of the people. All this time the king was surrounded by libertines, by whom the court was plunged into a profili
gacy which offended the nation. Meanwhile the attachment of the queen to Struensee exceeded, in appearance at least, the bounds of all moderation. In July, 1771, she was delivered of a princess, and her fears of the infamous reports which were likely to spread from the court of the queen dowager at Frederiksborg tended only to exasperate her husband. This power he shamefully abused. He was raised to the dignity of a count, together with his friend Brandt, and there is reason to believe that much of the enormous wealth of which he died possessed was wrung from the queen's misfortune. But this was not all. Struensee, it appears, was not so well pleased with the prince of Holstein as with the queen dowager. Its comments on Struensee's proceedings could not be silenced, except by revoking this freedom which he had granted only two years before with the hope of obtaining more popular support, as well as the many slight s he offered to his father and other relatives. And there is also the indignation of the people to the highest pitch; and even those who were most attached to him treated him with reserve and coldness. At this crisis took his movement to fail; he was suspended from all his duties, arrested, and the quickness in planning and boldness of
cuting which sustained it, gave place to a weak and vacillat-
ing fear of his daily increasing difficulties. An unimpor-
tant group of soldiers who had already shaken Stu-
ensee's firmness, and was followed by a revolt of the life-guards, whom he had dismissed with-
out any cause.

On this occasion Stuensen acted in a manner unworthy of
his rank in power; he acceded to all the demands of the
revolted soldiers, and sought to conciliate them by various
means. This disclosure of his weakness of character, to
which succeeded measures evidently calculated to secure his
life, caused the English ambassador to the
queen of the approaching downfall of the favourite.
The regard he felt for her made him even go further, and request
that she would remove Stuensen from the court, in order to
prevent the catastrophe which he foresew. But all his en-
treaties were in vain. The queen trusted too much to Stru-
ensee's prudence, who now made some changes in the depart-
ment of police, with the view of securing himself against any
danger. But the purport of those measures was too manifest.
The people naturally enough concluded that Stuensen was
conscious of having slighted the nation, and they began to
see that the prime minister was only a fortunate adven-
turer, whose career was drawing to a close. The partisans of
Juliana Maria and her son Prince Frederic regarded this as
an opportunity of doing that which it appeared to be
impossible to do otherwise. They planned a conspiracy with but and secrecy
that nothing whatever transpired which could have put
Stuensen on his guard. Early in the morning of the 17th
January, 1772, Queen Matilda, Stuensen and his brother,
Colonel Christian, Stuensen's friends and intimate friends,
were awakened. The evening before a ball had been given in the royal
palace. Stuensen, conscious of his own unpopularity, had,
according to his custom, surrounded the palace with guards on
whose fidelity he thought he could rely. General Eich-
stadt, who had gained the English ambassador to
change the soldiers, substituting his own dragoons in their
place. That evening the young queen danced much, and
closed the ball with Prince Frederic, about one o'clock.
At three in the morning, Colonel Köller, an old enemy of Stu-
ensee, entered his room and threw his榈 into his face,
that he had orders from the king to arrest the queen. At
the same time the conspirators—the Queen Dowager, Prince Frer-
dric, Rantzau, Köller, Gülberg, and Eichstadt—went into
the king's bedchamber, and forced him to sign the order for
the seizure of Stuensen and his partisans. The unfortunate
queen was brought to Kronenburg, where she was confined
until the end of May, 1772, when she was set at liberty
through the influence of the English government, and was reward-
ly.

Meanwhile a special commission was formed, in order to
try Stuensen. The charge, consisting of nine heads,
was given to the fiscal-general on the 22nd April, 1772.
During Stuensen's imprisonment, Dr. Münster succeeded in
the execution of a pamphlet on the extraordinary conduct of
the opportunity of his conversion was published, first at Copen-
hagen, in 1788, and translated into English by the Rev.
Mr. Wendenborn, and republished in 1826 by Thomas Ren-

By the sentence, which was pronounced on the 25th
April, 1772, Stuensen was to be deprived of all his digni-
ties and beheaded. His right hand was to be cut off, his
body quartered and broken on the wheel, and his head and
hand were to be stuck up on a pole. This sentence was
confirmed by the king in every point; and, on the 26th
April, Stuensen was decapitated, after witnessing the death
of his friend Brandt. Stuensen was undoubtedly a man of
great abilities, capable of great application to business,
and capable of a decisive resolution, as well as enlarged
and extended political views; but he was not overcharged
with a profound policy, the active vigour, and the superior judg-
ment requisite for maintaining him in his sudden elevation.
Towards the close of his ministry he acted without foresight
or address, as it, with the difficulties which augmented
around him, and the liberation of his political measures;
and his political measure, and soon effect a rise in the
trade, which had much suffered under former administra-
tions. For these services he was made a noble, and received
the name of Karlsbach in 1769; two years afterwards he
was appointed one of the ministers of state, and as such
he was the object of much opposition, in which he was
anewly, and in which situation he died, on the 17th of Octo-
ber, 1804.

He was a man of clear and enlarged views, remarkable
for the thoroughness of his political opinions, and firm principles, and strict order. He
showed himself able to appreciate talent, and this circum-
stance contributed very much to the amelioration of the departments over which he presided; yet he is not free from the
charge of nepotism. He shrunk from innovation, and abstained from reforming even where his judgment con-
In Apteryx, according to Professor Owen, the skull is chiefly remarkable for its smooth expanded elevated pyriform cranial portion, the total absence of supra-orbital ridges, the completeness and the thickness of the inter-orbital septum, the great development of the ethmoid, the small size of the lachrymal bones, and the expansion of the nasal cavity behind these bones. The tolerably semicircular ocipital region differs from that of other Struthionidae in the greater relative extent of its base, and in the comparatively slight lateral sinusities due to the temporal depressions. There is no vertical notch at the upper part of the single hemispherical tubercle in the basi-occipital for articulation with the atlas, as in the Ostrich and Emu, but it is entire, as in Rhea; the plane of the occipital foramen also has the same aspect as in that bird, in which it is more nearly horizontal than in the Ostrich. The supra-occipital plate forms a somewhat angular projection, corresponding with the small cerebellum, and is bounded on each side by a vertical vascular groove terminated by a foramen above and below; the ex-occipitals extend outwards and downwards external to these grooves in the form of obtuse processes compressed in the antero-posterior direction, and are slightly convex be-

hind and concave in front, where they form the back part of the wide meniscus auditorius externus. The occipital bones, and also the surrounding bones, were ankylosed together. The angle between the posterior and superior regions of the cranium can hardly be said to be produced into a ridge. The superior region is smooth, convex, and separated from the temporal region by a narrow ridge, rather a notch, than the occipital ridge. The sagittal suture crosses a little behind the middle of the upper part of the cranium. In one cranium Professor Owen found the left half of this suture persisting, but the right one entirely wanting; the two canals were also unequal; the left was much wider than the right. The external occipital rise is rounded and very slight; the external interparietal suture is obliterated, there being no trace of supra-orbital ridge, nor of antorbital or postorbital processes. This structure, Professor Owen observes, is quite peculiar to the Apteryx among birds, but affords a very interesting resemblance between it and the monotreme Echidna. The slender zygomatic process sent forwards by the temporal bone most resembles that of Rhea in its small relative development. Between the frontal bones, which gradually contract to their junction with the nasal septum, there is a space, ethmoid, which is more or less developed, and the narrow frontial region is traversed by a mesial longitudinal depression. The ethmoid bone is remarkably expanded; its cells, instead of being restricted to a narrow vertical septum of the orbits, as in the diurnal Struthionidae, occupy not only the ordinary orbital space, but extend outwardly more than two lines beyond the lateral boundaries of the anterior part of the frontal. A small process extends from the frontal to the side of the expanded ethmoid, anterior to the orbital foramina, which are distinct and remarkably wide apart, and the ethmoid, which is narrow in breadth, is also supported anteriorly by a similar anchoyed conjunc-
tion with the lachrymal bone. The Professor remarks that the nearest approach to this peculiar structure of the Apteryx is made by that of the interorbital, and which latter, though much thinner than in the Apteryx, is also occupied by ethmoidal cells, and is thicker than in any of the other large Struthionidae. The Ibis, he observes, offers a striking contrast with the Apteryx in this respect, the interorbital osseous septum being almost entirely absent; and it also differs widely in all the other parts of the cranium already noticed. In the posterior region of the skull of the Ibis the long covering of the cerebellum is, as he states, in great part defective: in the superior part, the cranial parietes above the cerebral lobes form two bones separated by a middle longitudinal depression, and the narrow space between the supra-orbital ridges is occupied by the impressions corresponding to the nasal or supra-orbital glands; the whole cranial part, more or less, is occupied by the brain to its breadth than in the Apteryx; and Mr. Owen remarks that the Ibis, in thus differing from the Apteryx, deviates also from the other Struthionidae.

The base of the skull of Apteryx exhibits all the peculiarities characteristic of the Struthionidae birds. The body of the sphenoid sends out two processes on each side externally; the posterior of these abuts against the tympanic bone, and the anterior one by a flattened oval articular surface against the pterygoid bone. Professor Owen points out that the latter processes exist, but are much more feebly developed in the Ibis, and that in most other birds, including the Gallinæ, they are wanting, whilst they are well developed in the Lacerine Suatera. A compressed vomerine process is found in the anterior part of the basi-sphenoid, and this process is ankylosed to the under part of the expanded and cellular ethmoid.

The olfactory depressions in the interior of the cranium are proportionally larger than in other birds, and the olfac-
tory nerve, instead of being continued at the posterior part of an interorbital septum by a bony canal or groove to the nasal cavity, immediately passes by many perforations through a cribiform plate to the complex and extensive parietal surface of the ethmoid bone.

Both internally and externally the optic foramina are distinct and half an inch apart; they are perforated not in the sphenoid ala, but in the inflected margin of the frontal bone. In these peculiarities the Apteryx differs from all the rest of its class; except in the optic foramina, where not only the optic nerve and ophthalmic artery, but also the third, fourth, first branch of the fifth, and sixth nerves, as in
most other birds. Of these nerves the fifth is the largest, and it is continued forwards to the nasal canal, through two foramina, one circumseribe externally by the process already mentioned, which extends from the frontal to the ethmoid; the other, by the corresponding process of the ischryymal. The ptilitary fossa, or sella turica, is a very deep semi-oval depression; the common internal orifice of the two carotid canals communicates with its posterior part.

On each side of the anterior part of the floor of the cranium, which forms the cavity of the orbit, there is a diminutive, slightly curved groove, terminated at its anterior extremity by the foramen rotundum, and at its posterior by the foramen ovale. These foramina are situated between the basilar and nasal bones, and near the foramen of the zygomatic process of the maxillary, and are relatively longer than in the diurnal Struthionidae. The foramen rotundum is only distinct, but is farther apart from the foramen ovale than in any other bird. The petros bone projects internally in the form of a thin semicircular plate of bone, commencing at the foramen ovale and extending backwards to the foramen auditorium internum, which it overhangs: this plate gives attachment to theテンプ。There is not any corresponding bony ridge developed from the upper wall of the cranium in the line of origin of the faix, as in many of the gallinaceous birds. The anterior or cerebral division of the cranial cavity is larger in proportion to the posterior than in most other birds.

The tympanum is trihedral, subcylindrical, and sends forwards into the orbit a process longer and more slender than that in the larger Struthionidae: its upper articular surface is a transversely extended convex condyle, playing in a corresponding cavity internal to the base of the zygoma. The opposite part of the tympanic's anterior extremity presents two distinct articular convexities for the lower jaw, the inner being the largest; a small but deep depression for the reception of the deflected extremity of the jugal bone exists above the external convexity. Between the orbital process of the tympanic and the transverse processes of the sphenoid bones, the posterior extremity of the pterygoïd bone is securely wedged in, and, advancing forwards, expanded, as in the other Struthionidae, into a thin plate of bone which unites itself with the convexity turning inwards, and is continued by ankylosis into the palatine bones, so that the limits between them are indefinable. So also the palatine bones are confluent with the maxillaries: the former are pierced by two narrow elliptical posterior nasal foramina, about three lines in length, over which the external margin of each palatine bone arches from without inwards. These overlapping laminae gradually approach each other, as they advance forwards, and meet about an inch anterior to the nasal foramina, from which an imperfect foramen transversarium is developed; a narrow oblong impression, and composed of the confluent palatal processes of the maxillary and intermaxillary bones, is continued to the end of the beak, where the limits between these bones being indistinct by the bone being raised at the mouth, and rising above the apex of the mouth, about two and a half inches from the apex of the beak. The jugal style in Apteryx consists of a single slender, compressed, twisted bone, ankylosed with the maxillary bone in front, and terminated behind by an obtuse deflected extremity, which is received into a corresponding vertical cavity in the upper part of the outer process of the tympanic bone. In the full-grown Ostrich this bone is separable into a cylindrical and maler portion. By the mode of attachment adopted in Apteryx, the tympanic bone is connected with the orbit by a transverse process extending to it by the lower jaw, at the same time that it gives additional strength to the upper mandible. As in the other Struthionidae, it is continued backwards in the same line with the upper maxillary bone, and is not bent downwards at its junction with the maxillary, as in the Ibis and other Grallae. The superior maxillary bone is singular, presenting the form of an elongated triangular plate of bone nearly perfectly flat, imperforate, and continued with the intermaxillary bone, and the anterior extremity of the Struthionidae. Of the Struthionidae, Rhea comes nearest to Apteryx in the structure of this part of the skull; but in Rhea large foramina perforate the maxillary plate, which sends upwards on each side a process, which, except the gap of the superior maxillary bones of the Ibis are slender round styles, with a wide interspace between them. Two compressed plates of bone, descending obliquely forwards from the anterior extremities of the frontal, and articulated below to a small depression in the maxillary plate, each pierced by a single small fora-

in the maxillary plate, each pierced by a single small fora-

men, represent the lachrymal bones in Apteryx. The continuous bony piece formed by the frontal, nasal, and inter-

maxillary bones is too strong to admit of any elastic yielding movement between the upper jaw and cranium.

The nasal and the upper or mesial portions of the inter-

maxillary bones form an elongated depressed narrow pro-

cess, convex above, with external margins bent inwards

beneath the long nasal passages, of which they form the outer as well as the upper part. This is an obtuse angle, which

The usual ornithic characters, with the Struthious modi-

fied in the individual peculiarities, are pre-

sented in the lower jaw of Apteryx. The transversely ex-

tended bone extends only to the extremity of the jaw, and

The same extended process for the attachment of the pterygoïd muscles; the superior transverse plate, behind the articular surfaces, is thin and concave towards the meatus auditormus externus, and is lined by the mucous membrane of that pas-

sage, of which it forms part of the bony parietes support,

are two distinct narrow oblique articular surfaces, concave in the longitudinal and convex in the transverse directions;

the internal one is the largest, and behind this there is a small excavation, into which a small process of the air-sacs lining the tympanum is continued; and this is the only part of the skeleton not immediately concerned in the formation of the organs of hearing or smelling into which air is admitted. The entry to the air-cells, in the lower jaw of the Ostrich, is displayed in the tympanic notch, 

of depression or sinus in the jaw of Apteryx. Traces of the compound structure of the lower jaw are very evident in that of the Apteryx, and the limits of the angular, articular, and coronal pieces may be in part defined. There is a shallow concave depression, from which the angular pieces have been separated and removed, and by the bicuspid commencement of the mandibular or dentary piece in front; the angular is compressed, and sends upwards a very slightly elevated bony ridge. A second narrower fissure occurs between the thick opercular or sole process of the mandible and the condyloid foramen of the mandibular piece. The opercular piece reaches to the posterior part of the symphysis, as in the Ostrich, and the rest of the lower jaw in front of this part is formed by the third and fourth, which are united by the cup-like extent of this an-

Jent, the Symphysis, the Rhea makes the nearest approach to the Apteryx among the Struthionidae, and the two impres-

sions which diverge from the back part to the front of the symphysis are present in both the Rhea and Emu, as in the Apteryx. The lower jaw of the Apteryx differs from that of the Ibis in its greater posterior expansion, its more de-

pressed form, the lower coronoid plate, the narrower fissure between the angular and surangular pieces, and the ab-

ence of the mesial furrow, extending in the Ibis to the end of the jaw.

Vertebreal Column.—The number of the cervical vertebrae in the Ostrich is eighteen, in the Casowary sixteen (true), in Rhea sixteen (not fourteen, as Couvier states), in the Emu seventeen, and in the Apteryx nine, the last, which, in the effect of the expansion of the cervical region, continues to the 8th vertebra; in the Ibis there are nine dorsal, and twenty-five remaining vertebrae in the lumbar, sacral, and caudal regions: the spinous column of Apteryx is relatively stronger, especially in the cervical region, than it is in the larger Struthionidae. The length of the cervical region, the vertebral of which presents the usual ornithic characters, is seven inches; that of the dorsal region four inches, and that of the portion of the column behind the dorsal vertebrae included between the osa innominata, three inches. The structure of the verte-

bral column in its broadest extent, is such as to show that the close resemblance of the bird to the reptile in its skeleton is well exemplified in the young Ostrich, in which even when half grown the cocky appendages of the cervical region continue separate, as in the Crocodile: those the Professor found ankylosed to the first fifteen vertebrae in Apteryx.

The nine caudal vertebrae of Apteryx are deeper and project farther below the posterior portions of the ilia bones than in the Ostrich, and are continued through the first five of these vertebrae, which, as they descend, progressively increase in lateral and dimininish in vertical extent, and are all movable upon each other ex-

cept the two superior; this combination to form a vertebral analogou-

s to the expanded terminal vertebrae of the Ostrich, but which in Apteryx exceeds the rest only in its greater length, and gradually diminishes to an obtuse point. Prof-

essor Owen proceeds to remark that in the Ostrich the
corresponding vertebra is expanded for the support of the caudal plumes, but that in Apteryx it offers the same in conspicuous development as in Rheas and the Emu.

The first dorsal rib is described as a slender style about an inch in length, and the rest as remarkable for their breadth, which is relatively greater than in any other bird; the Casuarius, in this respect, is stated to approach nearest to the Apteryx. The second, third, fourth, and fifth ribs are shorter and thinner than the preceding; the sixth rib, corresponding to the head and neck, as usual, is not developed, and it is attached to the transverse process by the part analogous to the tubercle. In the second rib a short and strong stylo-mandibularia is inserted by lamellae on each side. It is given off below and in front of the tubercle, and works in a corresponding socket at the anterior margin of the vertebrae. The head and tubercle, with the points of the vertebrae to which they are attached, intercept large foramina corresponding to the vertebrae, and those between these and the cervical region. Immediately below the tubercle the rib suddenly expands, and then gradually narrows to its lower end; the neck of the rib increases in length in the third and fourth pairs, and diminishes in the last two; the sixth rib begins to lose its breadth, and thus the least degree of the bony appendages to the vertebral ribs are developed in the seventh up to the eighth inclusive: they are articulated by a broad base to a fissure in the posterior margin of these vertebral ribs a little below their middle part; those belonging to the seventh rib overlap the succeeding rib; these processes are not anchored in the specimen described. The Rheas comes nearest to the Apteryx in the size of these costal appendages. The four first costal ribs are transversely expanded at their spine, and slant generally in the cervical region toward the surface lined with smooth cartilage and synovial membrane, and playing upon a corresponding smooth convexity in the costal margin of the sternum, which thus presents four costal foramina, between the middle and the external end, which elaborate structure is not however peculiar to the Apteryx among birds, but relates to the movements of the sternum, which are the centres upon which the respiratory motions hinge,—the angles between the vertebrae and the sternum, and these between these and the sternum, becoming more open in inspiration when the sternum is depressed, and the contrary when the sternum is approximated to the dorsal region in expiration. In the Struthionidae we look in vain for the deep erista or pleurocostal fold of the external surface of the bone, or that bony entrenchment which is so much in the male of so many birds: the costal margin is in the Struthionidae, with external foramina dorsal processes of the vertebrae, and the ribs are not free from the sternum as in the Apteryx.

In the Struthionidae we look in vain for the deep erista or pleurocostal fold of the external surface of the bone, or that bony entrenchment which is so much in the male of so many birds: the costal margin is in the Struthionidae, with external foramina dorsal processes of the vertebrae, and the ribs are not free from the sternum as in the Apteryx. In the Apteryx the coracoid is slender, cylindrical, styloid bone, one inch and five lines in length, and slightly bent. At the two extremities it is slightly expanded, but most at the anterior which supports a transverse articular convexity, adapted to the sternum groove before described. The third rib is reached by the scapula, which is a simple narrow plate of bone, one inch in length, slightly curved, and expanded at both ends, chiefly at the humeral articulation.

The true wing bones are best developed among the Struthionidae birds in Rheas; the next best development is in the Ostrich; the least development of the bones is in the Emu. The latter is characterized by the fact that the anterior extremity of the humerus is a slender, cylindrical, styloid bone, one inch and five lines in length, and slightly bent. At the two extremities it is slightly expanded, but most at the anterior which supports a transverse articular convexity, adapted to the sternum groove before described. The third rib is reached by the scapula, which is a simple narrow plate of bone, one inch in length, slightly curved, and expanded at both ends, chiefly at the humeral articulation.

Strongly contrasted with the flattened sternum and the dwindled anterior extremities are the strongly developed pelvis and posterior limbs of the Struthionidae. The pelvis of the Ostrich bears some resemblance to that of the extinct quadruped Mylodon, of which there is now a noble skeleton in the museum of the Royal College of Surgeons. In this part of the osseous system we have ample fulcrum for the powerful limbs, rendering the birds swifter than the swiftest. The iliac bones of Apteryx resemble those of the rest of the tribe in size and shape, and are four inches and three lines in length. There is a slight anterior concavity on the external surface of the acetabulum, which passes into a convexity posteriorly, the two surfaces not being separated by the transverse elevation which exists above the acetabulum in the four large Struthionidae. Be-
Struthious birds. Professor Owen observes that the ischia do not rest below the obturator, as in the Rhea, but are more distant from that and the iliac bones than in any of the Struthionidae; the pubic bones, he remarks, are not joined together at their distal extremities, as in the Ostrich; nor are the extremities of the ischia anchylosed to the super- numerary ilia, as in the Cauusornis. It is the Femur, he adds, that comes nearest to the Apteryx in the structure of the pelvis, but it also differs in the complete bony boundary of the foramen, which transmits the tendon of the obturator internus, and which is completed posteriorly by ligament in Apteryx. The acetabulum, he observes, communicates, as usual, by a wide opening with the pelvis, and a surface covered with a cushion of thick cartilage is continued from its posterior and upper part.

The great length of leg in the Struthionidae is produced, as in the true wading-birds, by the tibia and common bone of the tarsus and metatarsus, for the femur is comparatively of short dimensions.

The fibrous capsule of the hip-joint of Apteryx is very strong; the synovial membrane is reflected from it upon the upper margin of the trochanter and upper part of the short neck of the femur, as well as upon the ligamentous bridge, continued from the upper and extended margin of the acetabulum to its anterior part. The very large ligamentum teres is short, and consists of an indubitable process of synovial membrane, reflected from the circumference of the acetabular perforation to that of the depression on the head of the femur: this synovial sheath encloses two distinct ligaments, which are twisted about each other like the crucial ligaments of the knee-joint. One of the ligamentous bands passes from the upper margin of the acetabular perforation to the lower edge of the femoral depression.

The small round head of the femur (which last possesses in Apteryx the usual capitothracic character, and is thre inches or lines in length) is supported upon a very short and thick neck, placed at right angles to the great and single trochanter, and presents at its superior part a large depression for the strong and complicated ligamentum teres; its shaft is slightly bent with the convexity forwards, and this is increased by a thickening at the anterior part of the middle of the shaft. The condyles are separated anteriorly by a wide and deep groove, and, behind, by a triangular depression. The outer condyle is the shorter, and has an external groove for the articulation of the head of the fibula: the inferior compressed border of the condyle is wedged in between the tibia and fibula. Two angular and strong ridges are developed from the anterior part of the expanded head of the tibia, which is five inches in length: the external one affords attachment to the fascia and to the expanded tendon of the rectus femoris latissimus; to the internal ridge is affixed the ligament of the small cartilaginous patella. The knee-joint is very complex. The broad and thin internal lateral ligament gives origin to part of the soleus, and is attached to the internal semilunar cartilage. This fibro-cartilage divides at its anterior extremity into three ligaments: one broad and thick, going to the posterior face of the rotular cartilage, and representing the ligamentum muesuem; the other two inserted at the interspace of the condyles. A very strong ligament arises from the inner edge of the tibia beneath the internal semilunar cartilage, and is also attached to the same interspace. A strong external lateral ligament extends between the outercondyle and the head of the fibula; and beneath or within this there is a second ligament, which passes from the outer condyle to the external semilunar cartilage. From the anterior parts of this cartilage a thick ligament extends to the back part of the ligamentum patellae. From the back part of the external semilunar cartilage a posterior crucial ligament extends to the condyloid interspace; and, lastly, a strong ligament arises from the fore part of the head of the tibia, and passes upwards and backwards, to be inserted, with the preceding ligament, into the back part of the interspace of the condyles. The head of the tibia sends down an angular ridge posteriorly: the shaft is rounded, slightly compressed, converging to a ridge externally, to which ridge the fibula is attached in two places, beginning half an inch below the head of the fibula, and continuing attached for ten lines; then again becoming anchylosed, after an interspace of nine lines. In one specimen, Professor Owen found the fibula also anchylosed to the tibia by its expanded and thick proximal extremity; in descending it rapidly dimin-
three parts, with the articular pulleys for the three principal toes. The surface for the articulation of the fourth or small internal toe is about half an inch above the distal end of the internal phalanx; and, as in the case of the latter, the small osseous attachment by strong ligaments to this surface gives support to a short phalanx, which articulates with the longer ungual phalanx.

In the Ostrich the number of toes is two only; the Cassowary and the Emu have three. The Apteryx, and, according to the figures and remains, the Dodo, have four. In the Apteryx the number of phalanges of the three greater toes follows the ordinary law; the inner toe having three phalanges, the middle one two, and the most outer five phalanges.

Digestive System.—Though proper salivary glands can hardly be said to exist in birds, they have various glands for secreting a copious supply of mucus for the defence of the tender lining of the mouth and fauces. In the ostrich there are two large modified direct arteries to the pharynx, arising near the entry. The paries of the gizzard, though strongly muscular, are not remarkable for their thickness; the cuticular lining is very thick, and is here well preserved, showing its irregular surface adapted for triturating. The gastric glands are more complex than in the preceding preparations, and are aggregated in a mass of a circular form; their orifices are very conspicuous. The pylorus is protected by a projecting valve irregularly ribbed. The duodenum is much expanded with the pylorus, and partially inverted to show the peculiar flocculent character of its lining membrane. 533 D is a longitudinal section of the membranous and muscular parts of the stomach of an ostrich (Struthio Camelus, Linn.). The parts have been minutely injuncted to the cuticle. It has been readily dried after death, has been almost entirely removed, showing the vascular surface beneath. The gizzard, as in the preceding species, is a direct continuation of the membranous part, but its paries are much thicker. The all-like form of the pylorus, and its ribbed valve, may be seen on one side of the preparation; and on the opposite side is seen the duodenum laid open to show its villous inner surface.

Sir Everard Home, who presented the preparations above mentioned, thus describes the stomach of the ostrich:—In the African ostrich the gastric glands are similar in structure to those of the American, only the processes belonging to each gland are much more numerous; they are in general twenty or thereabouts. The cardiac cavity to which they open is not only very large, but is continued down in the abdomen below the liver to a considerable length, and then is bent up to the right side, and is there connected with a considerable portion of the esophagus, the cavity of which is of the shape and size of many grivorous birds in general. This gizzard is situated so high up, as to be nearly on a level with the termination of the oesophagus. The cardiac cavity is everywhere lined with a thin cuticle, except where the ducts of the gastric glands open. There is an opening in the left side, extending from the top to the bottom of the cavity, and about four inches broad. The size of the gizzard is small, when compared to that of the bird. The grinding surfaces do not admit of being separated to any great distance from one another. On one side there are two grooves, and two corresponding ridges on the other. Beyond the cavity of the gizzard is an oval aperture with six ridges, covered with cuticle, which oppose the passage of the contents of the cavity, if they are reduced to a small size. In the Cassowaries and American ostrich the stones and other hard bodies which those birds swallow, must, from their weight, force their way into the gizzard, which has a cavity adapted to receive them; but in the case of the ostrich all such substances must remain in the cardiac cavity, both from its being the most depending part, and from the cavity of the gizzard being too small to admit of their entering it. The cardiac cavity, in the instance which I examined, contained the stones and pebbles of the large size, but between the grinding surfaces of the gizzard there were only broken glass-beads of different colours, and hard gravel mixed with food. (Lect. on Comp. Anat.) No. 533 E of the stomach of a Cassowary (Casuarius galusintus) laid open, and constructed on the same type as the preceding. The gastric glands are dispersed over the protvermiculium with a similar degree of uniformity; but they are smaller, and their lower boundary is transverse. The cuticular lining being here preserved, shows that the membranous part of the stomach is lined with a thin layer, which, on the surface of the stomach, appears to the naked eye as a white, or yellowish, transparent film; the glandular part terminates. The gizzard has a similar lateral position, out of the direct passage of the food, as in the Emu; but is evidently more muscular. Its inner surface is thrown into irregular longitudinal rugae. The pylorus is protected by a projecting valve irregularly ribbed. The duodenum is much expanded, with the pylorus, and partially inverted to show the peculiar flocculent character of its lining membrane. 533 D is a longitudinal section of the membranous and muscular parts of the stomach of an ostrich (Struthio Camelus, Linn.). The parts have been minutely injuncted to the cuticle. It has been readily dried after death, has been almost entirely removed, showing the vascular surface beneath. The gizzard, as in the preceding species, is a direct continuation of the membranous part, but its paries are much thicker. The all-like form of the pylorus, and its ribbed valve, may be seen on one side of the preparation; and on the opposite side is seen the duodenum laid open to show its villous inner surface.

P. C. No. 1440.
In the stomach of the Aepyrys without a gullet-bladder there were two large ducts terminating in the same part of the duodenum. The posterior ends communicated with the tube last described, and the spleen was about the size and form of a hazel-nut.

Circulatory and Respiratory Systems.—In the same position of the duodenum, and opening orifice, the ventricle of the heart of an ostrich (Struthio Camelus) is open to the valves at the auricular and arterial orifices. In the right ventricle the orifice is guarded by two valves, as in the crocodile; but the one on the right side is here the largest, and when closed is...
vessels, as in the Mammalia; for the respiratory organs are
confined entirely to the thorax. The heart presents the
usual divisions of the right and left auricles, and ventricles.
The inferior cava, however, is not perforate, but the posterior
cava is a much greater relative capacity than that of the superior
cava, in consequence of these having to return the blood
from the inferior parts of the body. The ductus arteriosus
is still patent; the blood brought back by the jugular and
internal thoracic veins in other birds. There is no peculiarity
of structure in the auricles of the heart; but the resemblance to the Emeu in the
disposition of valves at the right and left apertures is closely
resembled. The posterior valve, which forms part of the boundary of
the foreman ovalis, seems, Professor Owen observes, to be
represented in Mammalia by the muscular ridge called the
anulus ovalis; the anterior valve is obviously the analogue of the
auricles of the other birds, and membranes, especially
Professor found the principal deviation from the ornithic
type of the structure of the heart in the valve at the entry
into the right ventricle. This is characterised in birds,
generally, by its muscularity and its free semilunar margin;
but in the Apteryx it is relatively thinner, in some parts
transparent and nearly membranous: a process moreover
extends from the middle of its free margin, and is attached
to two or three short chordic tendines to the angle between the
right and left auricules. This result of connection is approached an approximation to the mammalian
type of structure analogous to that which the Ornithorhynchus,
among mammalia, offers, in the structure of the same part
to the birds; for, adds Professor Owen, the right auricule,
the left auricule, and the truncus arteriosus are entirely
muscular and partly membranous. In the left auricule, and in
the valves between it and the left ventricle, there was
nothing worthy of note; the two membranous flaps were
unusual, presenting the usual characteristic of the mitral
valve in birds. With regard to the aorta, the principal dif-
fERENCE observed in the Apteryx was the equality of size in the
carotis: in the Emeu, Professor Owen found the right
carotid larger than the left. The descending or third portion
of the aorta is here very large, and is accompanied by other
Struthionidae, more of the character of the continuation
of the main trunk than in other birds, in consequence of
its greater size and thicker tunics, relating to the diminu-
tion of supply of blood transmitted to the rudimental
anterior extremities, and the increased quantity required for
the powerfully developed legs. The aorta, continues the
Professor, arches over the right bronchus as usual, and is
continued down the thorax to the intercapse of the crura of the
lungs, which lay united in the middle of the cavity, and in a
manner remarkably analogous to that which character-
ises the course of the aorta in the Mammalia. The Ap-
teryx, in fact, seems to be the only bird in which the limits
of the Hunter's region cannot be accurately defined; but,
in thus establishing this distinction it does not preserve a
noticeable difference from the mammalian arterial system, in
the fact that some large and important branches, which in
the latter are given off from the abdominal aorta, arise in
the present bird above the diaphragm, through which they
pass by distinct and proper apertures to the abdominal
viscera, which are destined to supply. Professor Owen did not observe any modification of that
condition of the venous system which usually characterises
the class of birds. The inferior cava did not perforate
the diaphragm, but entered the posterior part of the peri-
cardium just above the anterior fissure of the diaphragm,
receiving close to its termination the two large hepatic veins. Professor Owen observes that a small perforation of the veins
which regulate the quantity of blood transmitted to the lungs or the liver respectively, as
in other birds; and that this disposition has been erro-
neously supposed to indicate that the urine was secreted
from the venous blood in birds, as in reptiles and in fishes; but, he observes, the end attained by the venous anasto-
omoses in question bears a much closer relation to the pec-
nular necessities and habit of life of the bird, and, so far as he
has been able to judge, a true

There was not any trace of the extension of air-cells in the interspaces of the abdominal viscer a; and Professor Owen
was not less gratified than surprised to find a complete
and well-developed diaphragm separating the abdominal
from the thoracic parts of the body. This presents
any large openings corresponding to those by which the air
is continued into the abdomen in the other struthious birds,
m in the Physiological Series of the Mus. Coll. Chir., exhibits the brain of an Ostrich minutely injected, and the section of the cerebellum removed from the brain. Nos. 1352 to 1357, both inclusive, are preparations of the spinal chord of the same bird. The original description of No. 1355, which shows a portion of the gray matter and the white matter of the part of the medulla which lies in the loins and tail of an Ostrich. That part which lies in the loins is considerably larger than those which belonged to the neck and back; and then it becomes pretty fast smaller to the tail. This switch of balance which is so peculiar to bird brains, has such large thigs and legs; and when we consider that this bird, having such small wings, must have the whole progressive motion performed by the legs, and the legs are therefore longer in proportion to the size of the bird than in birds that fly. Look at this and see why the medulla ought to be large at this part in this bird.

Touch.—No. 1401 of the same series is a strip of cutis from the foot of the Ostrich, showing the papillae or coarse villi on that part: they are very closely set, and about a quarter of an inch in length, placed parallel to one another, and perpendicular to the surface which is applied to the soil in walking.

Taste is also well developed. Nos. 1474 to 1476, both represent the tongue, &c. of certain Struthionides. The two first exhibit those parts in the Ostrich: No. 1475 is the tongue, os hyoides, and larynx of a Rhea, in which the tongue is relatively larger than in the Ostrich, which has that organ of so small a size that it has been taken for an epiglottis. The tongue of the Rhea is studded over with minute black specs, which are the orifices of muciparous glands. In No. 1476, showing the same parts in a Casowary (Casaurina galusae), the tongue is said to be thin, broad, and very dry.

Small.—The olfactory system is well developed in the Struthionides. In the Apteryx it appears to be altogether larger than in other birds. Professor Owen observes that the nocturnal habits of the Apteryx, combined with the necessity for a highly-developed organ of smell, which chiefly compensates for the low condition of the organ of vision, produce the most singular modifications which the skull presents, and, he adds, that we may say that those cavities in which the olfactory organs are situated in the Apteryx, almost exclusively occupied by the nose.

Sight.—The eye is well formed, and the sight piercing in the Struthionidae generally; but, in the Apteryx, the eye has less development than appears in the rest of the family, the reasons for which are above assigned. It presents a remarkable deviation from the construction characteristic of birds generally, in the total absence of the pecten or marapulnaris, and the peculiar but well-defined and restricted locomotion of this species. The 'eyeball,' says Professor Owen, 'is relatively much smaller than in other birds; its antero-posterior diameter is three lines; its transverse diameter four lines. The cornea transparens is of the same thickness as the eyeball. The sclerotic is thin, but the margin supporting the cornea is strengthened by a circle of small osseous plates. The choroid is a delicate membrane; its pigment is of a light brown colour. The ciliary processes commence at the ciliary ring, each process having at its origin a slight linear raising, which becomes gradually wavy and tortuous as it approaches the lens, anterior to the circumference of which it projects freely to a small extent. The iris in the specimen examined was one inch and a quarter in thickness. The pupil is oval, by a small round aperture. The lens is two lines in breadth, and nearly one line at the thickest part, being thus more convex than in other birds. The external appendages of the eye presented no peculiarity, except the very great strength of the orbicularis palpebrarum; the membrane nictitans had the usual trochlear muscles: its free margin was black.'

Hair.—This same appears to exist in considerable perfection in the Struthionidae.

Renal and Genital System.—No. 1195 of the Physiological Series in the museum of the Royal College of Surgeons presents the kidneys of an ostrich, of an elongated flattened form, as described by the directors of the museum, extending deeply into the glandular substance as in most other birds: the anterior lobe, which is the largest, is nevertheless completely separated from the rest. The substance of the different lobes has a convoluted disposition like that of the reptiles, but is more compact. The renal arteries sent off from the aorta are shown on one side, and the corresponding veins joining the inferior cava on the opposite, while also the testes and supra-renal glands are seen: bristles are placed in the ureters. No. 2456 shows the testicles of a Rhea, which presents some peculiarities, particularly the structure of the vesicula seminalis, which is disposed so as to retract it into a spiral figure. 2459 is the penis of an Ostrich injected, showing the two fibro-cartilaginous substances, commencing by separate crura, and forming the principal part of the body of the penis. The whole circumference of this is continued the groove representing the urethra; the true corpus cavernosum is situated on each side of this groove; the part which is reflected back from the extremity of the penis, and seems to represent the glans, consists of the elastic lamigation which effects the retraction of the penis. At the commencement of the urethral groove the papillae are preserved, on which the vas deferens terminate: bristles are passed through these papillae. No. 2470 is a transverse section of the same, showing the vessels and tunica propria. The Ostrich from which the present and preceding preparation were taken stood eleven feet high. (Cat. Mus. Coll. Chir.) The penis is exposed and the groove exhibited which the bird produces while it is in the act of copulation. The ureters, which enter the bladder, are shown in their full length, and the termination of the oviduct, ureters, and rectum, with the urinary bladder and cecum of an Ostrich. (Catalogue.)

The kidneys of the Apteryx are situated symmetrically, and lodged, as in other birds, in the irregular hollows of the subiculum of the loins, and first part of the posterior surface of the kidney. Both the right and left consist of three segments, which are separated by triangular partitions, and divided into two or three lobes by oblique fissures extending into the posterior surface of the gland: the middle lobe is the largest. The lobes appear to have a compact and even surface, but their cellular organization can, Professor Owen states, be readily unravelled. The tortuous ureter emerges from the inner side of the posterior extremity of the kidney, and, after a course of an inch and a half, terminates in the upper and back part of the ure-genital cavity. The penis consists of two tubes which are sometimes divided into five lobes by oblique fissures extending into the posterior surface of the gland: the middle lobe is the largest. The testes appear to have a compact and even surface, but their cellular organization can, Professor Owen states, be readily unravelled. The tortuous ureter emerges from the inner side of the posterior extremity of the kidney, and, after a course of an inch and a half, terminates in the upper and back part of the ure-genital cavity. The testes were of a subcompressed oval figure. The vas deferens are formed by the union of numerous most minute effenter tubules, which pass from the testes, without forming an epiphalis, into a soft amorphous substance of a grey colour, which lies between the testes and the bright yellow supra-renal body. The vas deferens formed by the greater part of the tubules and surjective, are small, projects from below the external orifice of the urethra-sexual cavity into the vesical or outer compartment of the cloaca, rapidly diminishes to a point, and its extremity is spirally retracted. An urethral or rather seminal groove traverses the body of the penis. The outer surface of the cloaca and bent forwards along the abdomen, would be its under surface, and is continued to the end of its spiral extremity: the margins of the groove are not beset with papillae, but simply wrinkled transversely, as in the Emus and Ostrich. Immediately above the base of the penis there is, on each side, a considerable plexus of arteries and veins, over the base of which plexus vessels cross, which would, Professor Owen thinks, impede, if not arrest, the animal's motion. The ureters, as in other birds, might be termed compressores venarum penis, as they fulfil the same office as the compressores described by Douglas in the dog. Nothing deserving particular remark appears to have been observed in these male organs, though the careful statement of the detail in Professor Owen's paper well deserves the student's attention.

The mythology of Apteryx by that author is now before the Zoological Society of London, and we understand that the single species of Marabou is now known to be of the same family also as to be laid before that Society.

Systematic Arrangement and Natural History.

The place assigned to the Struthionidae of zoologists generally will be found in the articles Birds and Grallae. Mr. Vigors observes that those species of Tetramorium which exhibit a weakness or a deficiency in the hinder legs lead us at once to the three-toed groups of the Struthionidae.
with the bills of which, more particularly that of Rhea, those of some species of Tinamus correspond. Mr. Vigors includes for the genus of the Brontornis, or Rheas, in the genus Otis, with the genus Dodo [Bustard] of Linnaeus, which Mr. Vigors observes evidently agrees with them in their principal characters. It corresponds also, he adds, with the order Corvores of Temminck, with the exception of the wings. Mr. Cuvier, however, possesses more of the characters of the Wading than of the Gallinaceous order; but with which, he remarks, the present family will still be found to preserve its affinity by means of the circular disposition which, he believes, is seen to prevail throughout the divisions of ornithology. The chief genera comprised in the Struthionidae are the Rhea, which, in Mr. Vigors's opinion, unites this family with the last; Struthio, Linn, which having but two toes, and thus carrying the character of the group, he supposes to be considered the type; Casuar-rius, Briss.; Dromaeus, Veill.; Otis, Linn.; and Didus, supposed to be extinct. [Dodo.] In this arrangement the Struthionidae stand between the Tetraonidae and the Cracidae in the order Raras. Aepyryx was not sufficiently known when Mr. Vigors wrote. Mr. Swainson arranges the family in the same order between the Tetraonidae and the Columbidae, and he comprises under the Struthionidae the genera Otis and Struthio, the latter comprehending the subgenera Casuarrius, Dromaeus, Aepyryx (Aepyryx), and Rhea. From this family Mr. Swainson entirely excludes the Dodo, which was, in his opinion, the rasorial type of the Vulturidae.

Mr. G. R. Gray makes the Struthionidae the first family of the order Corvores, Temm., the sixth order in Mr. Gray's arrangement, and includes under it the following subfamilies and genera:

Subfam. 1. Struthionina.
Genera.—Struthio, Linn.; Casuarrius, Briss.; Dromaeus, Veill.; and Rhea, Briss.

Subfam. 2. Aepyrygina.
Genus.—Aepyryx, Shaw.
Subfam. 3. Didinae.
Genus.—Didus, Linn.

Subfam. 4. Otinae.
Genus.—Otis, Linn.; Tetrao, Leach; Syphoenixes, Less.; Charadrius, Less.; and Eupodotis, Less.

Amongst the Mammalia the Mammalia comprise the near approximation to the Ostrich, as amongst the birds the Struthionidae approach the most closely to the Mammalia and the Reptiles.

This approximation of the Struthionidae to the Mammalia especially cannot fail to strike the physiologist. In the first and typical genus, Struthio, it is strongly manifested.

STRUTHIONIDAE OF THE OLD WORLD.

Struthio (Linn.).

Generic Character.—Bill moderate, obtuse, straight, depressed at the point, which is rounded and unguiculate; mandibles equal and flexible; nasal fossa longitudinal, prolonged half way down the bill, open. Feet very robust; toes two only, stout and strong, directed forwards, and connected at their base by a strong membrane, the internal toe considerably larger than the external, and furnished with a thick and hoof-like claw, external toe clawless. Wings small, with seven feathers, fan-like and pointed. Tail small, and armed with two spurs, or rather two plumose shafts, not unlike a scorpius's quill. Head and upper half of the neck scantily covered with a thin down, through which the color of the skin is visible. It would be a needless occupation of space to give a minute description, which is so well known in these days of zoological societies and menageries. The Ostrich is generally understood to be the bird designated by the terms Deinornis or Dromiornis, Linne; Struthio, Linn.; Brontornis, Linne; Dodo, Linn.; and, in the common speech, the Ostrich is intended. It is the Neomach of the Arabs, Thar edjaimel (Cameb-bird) of the Orientals, Θρυγονον (Thrygononon) of the Greeks, Struthiocamelus of the ancient Italians, Struzzo and Struzzoli of the modern Italians, Streus of the Germans, Anatroche of the French, and Struthio Camelus of Linneaus.

Food, Habits, &c.—The approximation in the digestive organs of the ostrich to the structure of some of these parts in the Ruminantia, especially in the additional ventricle of the bird, is still further strengthened by the bicuspid foot, which may not be inappositely compared to that of the camel, and probably led in no small degree to its assimilation of Camel-Bird, to which, moreover, its height, lengthened neck, habit of frequenting the desert, and patience under thirst may have contributed.

The food of the ostrich consists of vegetable substances only, but seeds and grain appear to be preferred, and it is consequently a most unwelcome neighbour to the cultivator of the soil, on whose crops the bird commits great devastation. Its iron-eating propensities have long been celebrated, and indeed it picks up and swallows any mineral substance, metallic or not, with indiscriminating voracity. Nor is this propensity confined to the devouring of minerals; for leather, hair, cordage, and wood do not seem to come amiss. In the stomach of one of these birds Valisineri found a farrago of grass, nuts, cords, stones, glass, brass, iron, tin, copper, lead, wood, and among the stones one weighing more than a pound.

Perrault took from an ostrich's stomach seventy doubles, the greater part of which were worn down three-fourths of their substance by collision against each other or the pebbles found with them: those which were bent were worn and polished on the convex side, while they remained entire on the concave surface. These copper pieces had tinged everything in the stomach with green. This eagerness for picking up everything, whether or not it can be assimilated or can assist in the grinding down of the food by the action of the stomach, to which no doubt the polishing and wasting of the pieces of money mentioned by Perrault were due, is often fatal to the ostrich. Too great a quantity of copper or iron thus taken into the stomach has caused the death of the bird. Valisineri saw one killed by swallowing a quantity of quicklime, and one kept in the Gardens of the Zoological Society of London was first deformed and afterwards died from swallowing part of a parsol. Some of the heterogeneous contents found in the stomachs of these birds are preserved in the Museum of the Royal College of Surgeons (ante, p. 137).

Their speed is great. The swiftest greyhound cannot overtake them; and even the Arabian and his horse are obliged to have recourse to cunning as well as speed to close the chase, by throwing a stick dexterously between its legs, or otherwise to disable it. In its flight it spurs the pebbles behind it like shot against the pursuer. Nor is this its only mode of annoyance. Dr. Shaw, who gives a pretty
In this genus the wing is better developed than in any of the Struthionid birds, but it is still useless as an organ of flight.

The bird is standing in profile, with a lid on at its feet. Not any of the Dutch naturalists to whom I applied for information respecting the picture, the artist, and his subjects, seemed to be aware of the existence of this evidence of the Dodo in the Hague collection.

"I think I told you that my friend Professor Brodholt of Copenhagen had written to inform me that the skull of a Dodo had been lately discovered in the museum at Copenhagen: it had before formed part of the museum of the Duke of Guttsp."
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This is also the genus Dromicus of Vieillot, Tom. Gen., and the form is placed by Latham under the genus Conuarius, and by Temminck under Rhea.

The Emu, Enu, or New Holland Cassowary, Dromius Novae Hollandiae of authors, D. ater of Vieillot, and Dromicus Australis of Swainson, Parembong of the natives, has become quite familiar to us from the frequency of its exhibition in menageries, and its breeding so readily in a state of domestication. The following is Mr. Bennett's description of this species:—'

'In size and bulk the Emu is exceeded by the African Ostrich alone. It is stated by travellers to attain a height of more than seven feet, and an average measurement in captivity may be estimated at between five and six. In form it closely resembles the ostrich, but is lower on the legs, shorter in the neck, and of a more thickset and clumsy make. At a distance its feathers have more of the appearance of hair than of plumage, their barbs being all loose and separate. As in the other ostriches, they take their origin by pairs from the same shaft.'

Their general colour is a dull brown, mottled with dirty grey, the latter prevailing more particularly on the under surface of the bird. On the head and neck they become gradually shorter, assume still more completely the appearance of hair, and so thinly scattered over the forepart of the throat and around the ears, that the skin, which is of a purplish brown, is distinctly visible here. This appearance is more noticeable in the older birds, in which the feathers are left nearly bare. The wings are so extremely small as to be quite invisible when applied to the surface of the body. They are clothed with feathers exactly similar to those of the back, which, it should be observed, with all their fleshy red consists of a middle line, and fail gracefully over on either side. The colour of the bill and legs is of a dusky black; and that of the iris dull brown. There appears to be but little difference in colour between the two sexes; but the young, on first quittning the shell, have a much more elegant plumage. A brood of these has lately (1831) been hatched at the Society's garden, in which the ground colour is greyish-white, marked with two longitudinal broad black stripes along the back, and two similar ones on either side, each surrounded by a narrow middle line of white. These jettes are continued along the neck without submedian, and are broken on the head into regular spots. Two other broken stripes pass down the fore part of the neck and breast, and terminate as a broad band passing on either side of the thighs. As in the fully-grown bird, the bill and legs are of a dusky brown.'

Food, Habits, &c.—The food of the Emu consists of vegetables and seeds, but chiefly of fruits, roots, and berries. It is a state of nature at a very fast and dexterous hunter in the open plains, and is usually found in companies or small groups, the females and young birds being included.

This is not a quiet animal, and is not easily managed; but in the state of civilization to which it is subject in the Zoological Gardens, it is found very tractable, and bears itself very much in the same manner as the ostrich. It is said in the Zoological Garden at London to be about as large as an elephant, and is seen every day in the Zoological Gardens of Paris, at the Zoological Garden at Madrid, and at the Zoological Gardens of Vienna.
of both the upper and the lower mandible is more tumid in
the latter than in R. Darwinii, and there are other differ-
ences.

The first notice Mr. Darwin received of this species was
the Rio Negro, in Northern Patagonia, where he repeatedly
heard the Gauchos talking of a very rare bird, called Aestrix
Petase. They described it as being less than their common
ostrich, which is there abundant, and with differences of
colour, and said that it was more easily caught by the
Gauchos than the other species. The eggs of the small species appeared
more generally known, and it was remarked, with surprise,
that they were very little less than those of the common
Rhea, but of a distinctly different form, and with a tinge of
pale blue. Some eggs that Mr. Darwin picked up on the
plains of Patagonia agreed pretty well with this descrip-
tion, and he doubted not that they were those of the Petase.
He states that this species occurs most rarely in the neigh-
bourhood of the Rio Negro; but that about a degree and
half farther south they are tolerably abundant. One
Gaucher however told him that he recollected having seen
one, many years before, near the mouth of the Rio Colo-
rado, which is north of the Rio Negro. They are said to
prefer the plains near the sea. Mr. Darwin goes on to
state, that when at Port Desire, in Patagonia (lat. 48°)
Mr. Martens shot an ostrich. Mr. Darwin looked at it
and forgetting at the moment the subject of the Petase,
thought it was a two-third grown one of the common
Rheas. The bird was skinned and cooked before Mr. Darwil's
memory returned: but the head, neck, legs, wings, many
of the larger feathers, and a large part of the skin had been
preserved. This constitutes the specimen in the museum
of the Zoological Society.

'Among the Patagonian Indians in the Strait of Magel-
lan,' says Mr. Darwin in continuation, 'we found a half-breed
Indian, who had lived some years with this tribe, but had
been born in the northern provinces. I asked him if
he had ever heard of the Aestrix Petase. He answered by
saying, 'Why there are none others in these southern coun-
tries.' He informed me that the number of eggs in the
nest of the Petase is considerably less than with the other
kind, namely, not more than fifteen on an average: but
asserted that more than one female deposited them. At
Santa Cruz we saw several of these birds. They were ex-
deedingly wary: I think they could see a person approach-
ing, when he was so far off as not to distinguish an ostrich.
In ascending the river, few were seen; but in our quiet and
rapid descent, many, in pairs, and by fours or fives, were ob-
served. It was remarked by some of the officers, and I
think with truth, that this bird did not expand its wings,
when first starting at full speed, after the manner of the
northern kind. The fact of these ostriches swimming across
the river has been mentioned.'

In conclusion, Mr. Darwin remarks, that R. Americana
inhabits the eastern plains of South America as far as
a little south of the Rio Negro (lat. 41°), and that R. Dar-
winii takes its place in Southern Patagonia; the part about
Rio Negro being neutral ground.

We have said that we owe the perfect knowledge of this
smaller species to Mr. Darwin. There is no doubt that
others have seen it. Dobrizhoffer (1749) clearly was aware
of its existence. In his account of the Ahipones, he says,
'You must know moreover that Emus differ in size and
habits in different tracts of land; for those that inhabit the
plains of Buenos Ayres and Tucuman are larger, and
are black, white, and grey feathers; those near to the Strait
of Magellan are smaller and more beautiful, for their white
feathers are tipped with black at the extremity, and their
black ones in like manner terminate in white.' These
ostriches which Wallis saw at Batchelor's river (lat. 54°
54'), in the Strait of Magalhaens, were doubtless Petase.
Mr. Darwin notices these instances, and further remarks
that the distinguished French naturalist M. A. D'Orbigny, who
at Rio Janeiro, made great exertions to procure this bird
but did not succeed. 'He mentions it,' says Mr. Darwin,
in 'his Travels' (vol. ii. p. 76), and proposes (in case I
prosume, of his obtaining a specimen at some future time,
and thus being able to characterize it) to call it Rheas pre-
sata.' Now Mr. Gould has characterized it from the speci-
men brought home by Mr. Darwin (1837), who liberally
presented his valuable zoological collection to the Zoolo-
gical Society of London, and has given the interesting account
of its habits and geographical distribution above quoted.
Mr. Gould's name therefore must have the preference.
Rhea Americana has been exhibited alive in the Gardens of the Zoological Society of London, and specimens of both species are, we believe, to be seen in the museum of that Society and in the British Museum.

**AUSTRIAN AND NEW ZEALAND STRUTHIONIDS.**

**DROMAIUS. (Veill.)**

**Generic Character.**—Bill straight, with the edges very much depressed, rounded at the extremity, slightly carinate above. *Nostrils* large, protected by a membrane and opening above about the middle of the bill. Head feathered. **Throat nearly naked.** Feet three-toed.

**Foot of Emu.**

*This is also the genus Dromiceius of Vieillot, Th. Plenk., and the form is placed by Latham under the genus Casuarius, and by Temminck under Rhea.*

The Emu, *Emu, or New Holland Cassowary, Dromaius Novae Hollandiae* of Audubon, *D. ater* of Vieillot, and *Dromiceius Australis of Swainson, Parmenogen* of the natives, has become quite familiar to us from the frequency of its exhibition in menageries, and its breeding so readily in a state of captivity. The following is Mr. Bennett’s description of this species:—*In size and bulk the Emu is exceeded by the African Ostrich alone. It is stated by travellers to attain a height of more than seven feet, and its average measurement in captivity may be estimated at between five and six. In form it closely resembles the ostrich, but is lower on the legs, shorter in the neck, and of a more thickset and clumsy make. At a distance its feathers have more of the appearance of hair than of plumage, their barbs being all loose and separate. As in the other ostriches, they take their origin by pairs from the same shaft.* Their general colour is a dull brown, mottled with dirty grey, the latter prevailing more particularly on the under surface of the bird. On the head and neck they become gradually shorter, assume still more completely the appearance and form of a short scaly feather, and on the forepart of the throat and around the ears, the skin, which is of a purplish hue, is distinctly visible. This appearance is most remarkable in the older birds, in which these parts are rather bare than covered with feathers, and are so often exposed to be quite inviolable when applied to the surface of the body. They are clothed with feathers exactly similar to those of the back, which, it should be observed, divide as it were from a middle line, and fall gracefully over on either side. The colour of the bill and legs is of a dusky black; and that of the iris dull brown. There appears to be but little difference in colour between the two sexes; but the young, on first quitting the shell, have a much more elegant liveliness. A brood of these has lately (1831) been hatched at the Society’s garden, in which the ground colour is greyish-white, marked with two longitudinal broad black stripes along the back, and two similar ones on each side, each subdivided by a narrow middle line of white. These stripes are continued along the neck, without subdivision, and are broken on the head into irregular spots. Two other broken stripes pass down the fore part of the neck and breast, and terminate in a broad band passing over on either side across the thighs. As in the fully-grown bird, the bill and legs are of a dusky hue.*

**Food, Habits, &c.**—The food of the Emu consists of vegetables and seeds, but chiefly of fruits, roots, and herbage. In a state of nature it is very fleet and affords excellent sport in courting with dogs, which are however rather shy. *NB. This is not quite correct. In the African Ostrich the feathers have no necessary place, either have those of the Apteryx. A tale of four preserved specimens in the Zoological Museum, besides the double feather, there is also a second accessory plume, so that the quill supports three distinct shafts and vane.s (Owen).*

P. C. No. 1441.

M. Lesson, in the Zoology of the Voyage of Vol. XXIII.—U
de la Coquille (1828), had noticed the existence of "a bird without wings," fragments of which were brought by the natives, which appeared to him to be those of the Emu, and he says that M. Kendall had confirmed this idea by affirming the existence of Cassowaries analogous to those of Australia in the woods of New Zealand. He adds that the natives call the bird *Kiveli*, and hunt it with dogs, and that he doubts not that the bird is the *Apteryx Australis* of Shaw.

In the *Voyage de l’Astrolabe*, M. d’Urville states that it was in the Bay of Tolaga, or Houa-houa, on the east coast of the most northern of the two islands of New Zealand, that he obtained the first positive intelligence as to the nature of the *Koiti*, as he writes it, from observing a mat or dress (natte) adorned with the feathers of the bird, which is one of the first objects of luxury to the natives. According to them, he adds, the *Koiti* is a bird of the size of a small turkey, but, like the ostrich and cassowary, deprived of the faculty of flight, common in the neighbourhood of Mont Ikou-Rangui, and is hunted at night with torches and dogs. M. d’Urville concludes by remarking that it is probable that these birds belong to a genus closely approximating to the cassowaries, and that he believes that it has already received the name of *Apteryx* from some authors; and he mentions a second time the dresses of the chiefs on solemn occasions as being ornamented with the feathers, and refers to the following note in Cruise’s *Journal of a Residence in New Zealand* (1822):—*The Emu is found in New Zealand, though we were never fortunate enough to meet with one. The natives go out after dusk with lights, which attract their attention, and they kill them with dogs. Their feathers are black, smaller and more delicate than those of the Emu of New Holland; and a mat ornamented with them is the most costly dress that a chief can wear.*

MM. Quoy and Gaimard, in the *Zoologie de l’Uni-}

Food, Habits, &c.—Worms, insects, especially the larva of *Lepidoptera*, and probably snails, appear to be the food of this species. Mr. Gould states that the favourite localities of the bird are those covered with extensive and dense beds of fern, among which it conceals itself, and when hard pressed by dogs, the usual mode of chasing it, it takes refuge in crevices of the rocks, hollow trees, and in the deep holes which it excavates in the ground in the form of a chamber. In these latter situations, Mr. Gould tells us, it is said to construct its nest of dried fern and grasses, and there deposits its eggs, the number and colour of which have not been clearly ascertained.

Mr. Gould, who has given beautiful and accurate figures of the bird in his grand work *The Birds of Australia*, states that since Mr. Yarrell wrote, he had become acquainted with five additional specimens, and had obtained further information respecting the history of the species. Two of these, from which his figures are taken, were presented to the Zoological Society by the New Zealand Company; and that Society possesses a third but imperfect specimen, presented by Alexander MacLeay, Esq., of Sydney. Two or three have been recently added to the collection of the Earl of Derby, one of which his lordship liberally presented to Mr. Gould.

Description.—Face and throat greenish brown; all the remainder of the plumage consisting of long lanceolate hair-like feathers of a chestnut-brown, margined on each side with blackish brown; on the lower part of the breast and belly the feathers are lighter than those of the upper surface, and become of a grey tint; bill yellowish horn-colour, its base beset with numerous long hairs; feet yellowish brown. (Gould.)

This is the *Apteryx Australis of Shaw; Apteryx of Temmick: Apteryx of Latham; and Kiri-Kiri or Kiri-Kiri of the aborigines of New Zealand.*

The length from the point of the bill to the end of the tailless body is about thirty-two inches; but the bill is much longer in some individuals than in others, and it is not satisfactorily made out whether this difference of length is to be attributed to difference of age or sex; but it has been supposed that the female has the longest bill.

The toes are four in number; the three anterior ones are unconnected. The hind toe is placed on the inner flattened surface of the tarsus; is directed backwards, and almost perpendicularly downwards; it measures only 1 inch, and of this the claw or spur measures 1/2 of an inch. In the size and position of this toe the *Apteryx* corresponds with the *Dodo.*

Bill of *Apteryx*. (Owen.)

Mr. Short, in a letter to Mr. Yarrell, states that when undisturbed, the head is carried far back in the shoulders, with the bill pointing to the ground; but when pursued, it runs with great swiftness, carrying the head elevated like the ostrich. Its habits are said to be almost exclusively...
nosturnal, and the natives usually hunt it by torchlight, seeking for it with the utmost avidity, the skins being so highly prized that a number of them in the shape of a fez, six inches in length, and five inches in diameter and a half in its smallest circumference, with both extremities broken off. This bone of an unknown struthious bird of large size, presumed to be extinct, was put into the Profes-
sor's hands for examination, by Dr. Rule, with the state-
ment that it was found in Moreton, and where the natives have a tradition that it belonged to a bird of the Eagle kind, which has become extinct, and to which they give the name 'Movie.' Similar bones, it is said, are found buried in the banks of the river near the same place. After the description of the bone, Professor Owen proceeds thus:—"There is no bone of similar size which presents a cancellous structure so closely resembling that of the present bone, as does the femur of the ostrich; but this still resembles a bone of Horseshoe form fine shaft, where the pteryges of the medullary, or rather air-
cavity, are smooth and unbroken. From this difference, I conclude the Struthious bird indicated by the present frag-
ment to have been a heavier and more sluggish species than the ostrich; its femur and probably its long legs, is shorter and thicker. It is only in the ostrich's femur that I have observed superficial reticulate impressions similar to those on the fragment in question. The Ostrich's femur is sub-compressed, while the present is cylindrical, approaching in some respects to the anterior tibia of a scrap.

In 1773 he published his first work, 'The Regal and Ecclesiastical Antiquities of England,' containing the repre-
sentations of the English monarchs from Edward the Con-
temporary to Henry the Seventh, in quarto; a new edition of which he published, with a supplement, in 1801.
In 1774 he published the first volume 4to. of what he called 'Horda-Angel-Cymnna, or a complete View of the Manners, Customs, Arms, Habits, &c. of the Inhabitants of Scotland, from the arrival of the Saxons; the second vol-
ume of which appeared in 1775, and the third in 1776. In 1777 and 1778 he published his 'Chronicle of Eng-
land,' in 2 vols. 4to. He had intended to bring this work down to his own time in six volumes, but not meeting with the encouragement he looked for, he stopped at the Nor-
man Conquest.

His next work was 'A Biographical Dictionary, contain-
ing an Account of all the Engravers from the earliest period to the present time, illustrated by engravings,' 2 vols. 4to., London, 1783 and 1785; a work very creditable to his judg-
ment and industry.

In 1790 an amicable complaint rendered a country resi-
dence necessary, when he retired to Bacon's farm in Hert-
fordshire, where he employed a part of his time in engraving a series of plates in imitation of 'Pilgrim's Progress.' Here he remained for four or five years.
In 1795 he returned to London, and began collecting materials for his 'Complete View of the Dress and Habits of the People of Scotland,' which was the first instalment of the Saxons in Britain,' the first volume of which he published in 1796, and the second in 1799.
In 1801 he published the last work he lived to complete, on 'The Sports and Pastimes of the People of England,' 4to.; reprinted in 1810, 4to., and again in 5vo. edited by William Hole, in 1830.
He died, in narrow circumstances, in Charles Street, Hatton Garden, October 16th, 1802. He left some manu-
scripts in the possession of his son, from which 'Queen Hoo of the True Times of England,' 3 vols. 12mo.; and 'The Test of Guilt, or Trials of Antient Super-
sition, a dramatic tale, with the Bumpkin's Disaster, &c.' 4to., have been since published.
Nichols, in his 'Literary Anecdotes,' whose account we have principally followed, mentions (vol. v., p. 685, 686) a considerable number of single plates which Mr. Strutt engraved and published, as well as a few paintings in oil and drawings.

STRUVE, GEORG ADAM, was born at Magdeburg, on the 26th of September, 1619. His father, the proprie-
tor of Wandsleben, was judge in the supreme court of the duchy of Magdeburg. The family of Struve came originally from Brunswick, in which the grandfather of the subject of this sketch resided, and was ancestor of the mother of G. A. Struve had occupied high judicial offices, and others had pursued, with success, the career of University honours. Struve's father was too much occupied by his judicial
duties to superintend the minute details of his son's education; but his mother laboured anxiously to instill devotion to a life of watchful duty, and to form the infant mind. He received instruction in the first elements of Latin, and other branches of knowledge, at the Lyceum of Magdeburg, until he attained his eleventh year. In 1630 he was sent to the gymnasium of Wittemberg, where he remained till 1636. His principal tutor was Reyher, a man of great reputation as a teacher, who, besides grounding him thoroughly in Greek and Latin, imparted to him some notions in philosophy and belles-lettres.

While he had suffered much during these six years from the destruction of Magdeburg by Tilly's army, and the devastation of the district in which their property lay. They led an unsettled life for several years, sometimes in one town, sometimes in another. During the winter of 1637, at the close of their last residence in Magdeburg, they ventured again to take up their abode at Magdeburg. Not long after their return, Georg Adam arrived at the house of his parents a few days sooner than he was expected. Six years had so completely changed his appearance, that he was received as a stranger both by his parents and sisters, who did not recognise him until he declared himself.

In June, 1636, Struve entered the University of Jena. The taste which he had acquired for literature and science from his schoolmaster, and which had led him, although the law was his professional study, to devote a good deal of time to the philosophical classes. He attended the lectures of Philip Herst upon ethics; of Daniel Stahl upon logic and metaphysics; of Johann Zeitold upon physical; of Johann Michael Dehler upon oratory and history. These were branches of knowledge which the jurists of his day were only in a few rare instances beginning to cultivate, but he found, in after-life, advantage from the philosophical aspect of his intellectual discipline. Even at an early age, if we may credit the narrative of his son, he had become aware of the important lights which a study of history was calculated to throw upon the doctrines of law, and the advantage a lawyer might derive from cultivating a logical present in the management of his cases and an elegant style of his communications. So strong was his sense of the latter requisite, that, in addition to the public lectures on rhetoric, he attended private classes for practical exercise in oratory. Seeing how much depended in law upon precision of language, he extended his inquiries into the field of philology.

All these pursuits however were carried on in subordination to his legal studies. He attended the lectures of Peter Dietrich, Erasmus Ungetzauer, and Ortholph Fommus. The former was a relation of his mother's. The young man had been confined to his superstintione, a trust which he conscientiously discharged by a watchful direction of his private studies. Struve had no relish for the wild merriment which then, even more than in modern times, was the passion of the German student. He seemed to have been of a quiet and even timidity disposition, for a fright that he got from some soldiers, when a marauding party plundered Jena, soon after his arrival at the University, impaired his health sensibly for several years. His irreproachable conduct prepossessed the professors in his favour; and the distinguished appearance he made in a dispute which he maintained, in the philosophical faculty, on his thesis 'De Victoria et Clade,' in 1638, raised great expectations of his future eminence. He quitted Jena on the 11th of September, 1639, and his public certificate from the head of the University was more usually flattering.

He remained two years in his father's house for the purpose of re-establishing his health, which had not yet recovered from the effects of the shock above alluded to. In the year 1641 he entered himself at the University of Helmstadt, where he remained till April, 1645. Hermann Conring, who was then attending the University, attended the longer of the 1641 his lectures on the history of ancient Germany, to which the 'Germania' of Tacitus served as a text-book. In the winter of the same year he heard Rudolph Diefhold's lectures upon 'genero logia historicia,' as a part of the instruction of Cothenius, whose lectures on politics he attended at the same time. In 1642 he was a member of a class to which Conring expounded the 'Ethics of Aristotle.' Heinrich Hahn, at that time the Dean in Germany, had ceased to lecture, but he was fortunate enough to be elected as his amanuensis on some occasions, and heard the 'Pandects' explained by his colleague. Wessenbeck. His relation with Conrad Horn was more intimate, for his father had placed him under the immediate control of that professor, who exercised him, along with his other pupils, unremittingly in private disputations. In January, 1642, Struve maintained a public disputation in the juridical faculty, on a thesis 'De Dominis, His praedicamentis, Hominum aetate antiquissimae, aut casu provenientibus, harumque correctionibus et postestationibus.' And in July, 1643, he maintained one in the philosophical faculty, on a thesis 'De Ducibus et Comitibus Imperii Germanici.' In February, 1645, he again supported a juridical thesis, 'De Casibus,' and having been admitted to the preliminary examinations, received his licence as candidate for the degree of Doctor of Laws.

Two months thereafter, before he had completed his 26th year, he was appointed to the Chair of Law at the University of Magdeburg, and to the magistracy of Halle, an office which he retained not quite a year and a half. In the month of February, 1646, he received as a matter of course the title of Doctor; and in the December following he was bidden to fill the chair of law in the University of Jena, left vacant by the death of Fibigius. He was admitted an assessor to the magistracy in January, 1647; and in June, 1648, an assessor to the high court of the circle of Saxony.

He continued in the discharge of his judicial and academical duties, being a man of great legal acuteness, and possessed of fine reasoning powers, and not without adroitness in controversies relating to public and those relating to private rights. The town of Brunswick, being at that time involved in a dispute regarding its privileges with the duke, proposed to Struve to undertake the management of their legal business, and he, having been elected one of the patrons of the university, was appointed, on the 26th of March, 1661, counsel in ordinary to the good town of Brunswick for three years, with an annual salary of 300 dollars. Entertaining from his own experience a high opinion of the benefits to be derived from disputations, he encouraged his pupils to engage in them, often among themselves, as being of advantage under his guidance; and in course of time the idea suggested itself to him of making the young men maintain in succession disputations on all the leading doctrines of the day. In this manner arose his 'Syntagma Juris Feudalis,' first published in 1653, and his 'Syntagma Juris Civiles,' first published in 1656.

He received unexpectedly, in the year 1657, the appointment of privy counsellor to the duke of Weimar, and transferred himself with his family to the seat of government in the month of December. His discharge of the duties of this office gave so much satisfaction, that the line of Saxo-Altenburg became extinct in 1672, and duchy was annexed to the crown of Germany; and the nearest claim to the succession, he was selected as the ablest person to advocate the cause of his masters. In the conduct of this delicate business he met with material. The merit or good fortune to give entire satisfaction, both to the party for whose interest he acted, and to that to which he was opposed. When the territories of the house of Weimar were divided between the brothers, he remained in the service of the duke of Weimar. Notwithstanding the load of public business cast upon him during this period of his life, he contrived to find some time for the literature of his profession. He published in 1669 answers to objections which had been urged against him with regard to the doctrines maintained in his 'Syntagma Juris Civilis' and which had been the subject of a controversy in the court of Weimar. All the examination he had received at the University of Jena, and the best school for the qualification of a lawyer was then uni-
formly held. On the 28th of July, he made with his family a sort of triumphal entry into Jena; to the citizen and the members of the consuls and in procession at some distance from the town. The important offices to which he had been appointed continued to fill till his death, although the active discharge of their duties was interrupted for a time by the stormy political events.

On the death of Duke Bernard, to whose share the ducy of Jena had fallen at the partition of the Weimar territories, his son Johann Wilhelm, a minor, succeeded. His uncle Johann Ernest of Weimar was guardian, but it was not long before the permanent council of regency should sit at Jena. Struve was appointed president of this body about the end of August, 1680. In virtue of this appointment, the whole burden and responsibility of the general executive government of the territories, of the discharge of the finances, fell upon his shoulders. He was obliged to relinquish to another the discharge of his professorial duties, reserving however his appellate jurisdiction as ordinarius.

So many cares naturally distracted his attention from the pre-eminence he had himself assumed, and which was consequently dilapidated in consequence of his elevation. His pre-eminence was too exposed to him much malevolence; but he laboured indefatigably, and gave satisfaction both to the citizens of Weimar, and to the council of Eisenach, with which his death succeeded him in the regency. The young duke of Jena died towards the close of 1690, not long after a partition was agreed to by the lines of Weimar and Eisenach, and the council of regency being dissolved in consequence, Struve was alone in the functions of the office.

His life at Jena, both before and after this interruption, though a busy was a uniform one. As privy counsellor he attended every consultation to which he was summoned by the dukes his masters. As ordinarius, he presided at the courts and appeals and tribunals of Jena. He prepared opinions in reply to the cases addressed by numerous applicants either to the Judicial College of Jena or to himself individually. In addition to these judicial duties, he faithfully expended all his leisure hours in the pupils of the canonists, and in the canon law as then received in the courts of the Protestant states of Germany. After the dissolution of the regency, he did not again enter the academical chair, but continued nevertheless, with unabated diligence, to urge on the literary undertakings to which his professional duties had previously led him, and which, even whilst acting as vice-regent, he had not neglected. He prepared a new edition, with notes explanatory of the points in which the Lutheran deviated from the Roman Catholic system of canon law; and a treatise on the canon law of the Holy Roman Empire. These works continued the branch of jurisprudence, which he used as a text-book; but it was not published till 1680, when other cares prevented him from continuing his labours. The chief ambition of his latter life was to bring the canonical law of the Protestant Church into a better and more systematic form. With that view he projected various works; but on account of their extent, and the interruptions he experienced, only fragments of them were completed. A projected "Jurisprudentia Canonicarum," of his own jurisprudentia Romano-Germanica, remained a mere project. Of a complete "Commentary on the Five Books of the Decretals," only that which relates to the fifth book, "De Dei," was published, at Jena in 1691: it appears that he and his georg Gotthelf acted as editor. It was his intention to treat the doctrine of marriage in a much larger manner in his annotations on the fourth book: valuable materials were collected for the purpose; and he had resolved making his son Burkhard Gotthelf digest them under his own superintendence and direction. But he preferred accepting the kind offer of his brother at Darmstadt, as has been noticed in the preceding article. The materials for a projected treatise "De Caesae et Beneficiis Ecclesiasticis" were in like manner abandoned in consequence of his death. The manuscript was found and printed, after the great structure was completed and alone survived him. He found time, amid all his labours, to compile a system of the common law of the Empire in the German language, a work which was undertaken at the request of Duke Johann Wilhelm of Jena and published at Jena in 1682, which was the first German treatise of the kind, and gave a severe shock to the prejudices of most of his contemporaries. The autumn before his death he undertook to prepare an edition of the "Crinumia" of Carpochius for a Leipzig bookseller, but death prevented the undertaking."
justa per osvlt moasinnmus Ailius Burcard Gottkef Struve, Jenæ, apud Johannem Bleikum, (1705.)

STRUE, BURKHARD, son of Gottlieb, third son by the marriage of Georg Adam Struve, was born at Weimar on the 20th of May, in the year 1671, and was carried to Jena, when his father transferred his residence to that University, on the receiving of the appointment of Ordinarium of the Judicial College there, in 1674. Great pains were taken with his education by his parents; and in afterlife Struve often acknowledged his obligations to Johann Friedrich Durre, who had the charge of his elementary education. An incident mentioned in the Memoir of his father, who was published in 1705, is the expression that the old gentleman treated him in boyhood like a favourite playing. The last Geo Adam Struve presided at the creation of a number of doctors of law, in the year 1680, he commanded Burkhard, then a boy of nine years only, to make his remarks, and put questions with the rest of the assembly.

Not long after this event the boy was sent to the gymnasium at Zeitz, and confided to the care of Christopher Collarius, rector of the school, a man himself so useful to his predecessor, both in his private study and in the public library, that he gained his confidence sufficiently to be employed as an assistant upon the corrected and enlarged edition of Faber's 'Lexicon,' which he has since devoted to the public.

Burkhard Gottlieb Struve, having attained his seventeenth year, returned to Jena for the purpose of commencing his university studies, in 1788. His father, who was then engrossed with the labours which fell to his share as Emperor of Germany, and of the higher offices of the state, was, in fact, not only well qualified for the time of the day, and fashionable, but was a master of the exercises of the professorial office. At the urgent request of his son however he consented to give private instruction, on Wednesdays and Saturdays, to him and eleven of his young associates, in the system of Roman law, which was imposed upon them by the tribunals of Germany, and the plan of tuition pursued was to examine the pupils upon the elementary treatise on this branch of law compiled by their instructor, and to exercise their reasoning powers upon contingencies. But he attended at the same time the prelections of Johann Hartung and Peter Müller in Roman law. He seems however to have been a more skilful frequenter of the literary classes of Jacob Müller, Andreas Schmidt, and especially of Georg Schubart, the younger of the University, under whose presidency he held, in 1659, a public dissertation upon some theses added to his dissertation 'De Ludis Equestribus.' Not long after he disputed in the juridical faculty on the legal doctrines 'De Auro Fluviatis et Marinis,' which he had termined in his auditory with admiration of his precocious talents. While thus engaged, he did not neglect pursuits more consonant to the tastes of his age, country, and academical associations. He learned dancing, and was for a time a frequent attendant of the ladies and gentlemen of Jena. In course of these pursuits, he devoted himself with ardour, in his leisure hours, to the study of the French language. In the Memoir of his father, already alluded to, he mentions that about this time he was employed by his father in a collaboration in the Latin treatise 'Jurisprudentia Romano-Germainica Forensis,' with his work on the same subject in German, to show that the one was not a mere translation of the other, but a different work. The statement which Burkhard drew up on this occasion was meant to be inserted in the pleading of the publisher of the German work, against whom the publisher of the other had brought an action; but it was published, at a later period, by the bookseller, as a preface to a new edition, without the compiler's knowledge or consent.

As second son, the rector, and the son of a university professor of Helmsdtadt, for the purpose of studying history under Heinrich Mebom, and civil law under Georg Engbrecht. After a year's residence at Helmsdtadt he went to Frankfort on the Oder, in order to attend the meetings of Samuel Struyk and Peter Schults. During his abode at Frankfort he engaged in a controversy which led him to appear for the first time in print. An obscure jurist of the name of Schnegel had published, in 1699, a treatise 'De Conceru Croitorum,' in which he attacked some doctrines laid down by the elder Struve, in his 'Institutes of Forensic Law,' regarding the civil qualifications of criminals and the rights of property by dowry. Burkhard asserted the correctness of his father's views in a pamphlet, which he called 'Struvius non Erras,' and which, to judge by the warmth with which he speaks of the controversy at a much riper age, must have been rather bitter. Schnegel replied in the same strain, but his young antagonist was induced by the advice of older and cooler friends to allow the matter to rest.

In 1691 Struyk having accepted a chair in the university of Wittenberg, Struve returned to Jena, and was soon afterwards sent by his father to Weimar to attend the sessions of the Supreme Court, in order that he might make himself master of the forms of process. The dry details of legal practice were repulsive to a mind early accustomed to the self-indulgent habits of the abode of learning, and to pursue attendance to the skill in more literary controversy. Instead of frequenting the court, he directed himself almost exclusively to the theory and antiquities of public and feudal law. In such a frame of mind he lent a willing ear to the lectures held out by an elder brother to make a tour to Belgium, and afterwards join him at Darmstadt, where he was established as a practising lawyer. He in consequence visited in succession Goth, the Hague, Amsterdam, Rotterdam, and Leyden, and in every one of these towns he made an account of the objects he received. He afterwards confessed that his thoughts during this journey were rather distracted by the gayety and splendour of the towns he visited, than earnestly bent upon extending his knowledge; nor was this very unprofitable in a field in which his heart was not set. It is said however, to have derived some benefit from the conversation of distinguished scholars in Utrecht and Leyden.

At the request of his brother he repaired to Frankfort to take charge of some business for the transaction, with which he was acquainted, of an important estate in a very considerable sum, at the time of the fair, and the novelty and bustle of the scene left a lasting impression upon Struve's mind. The affairs which required his presence there being arranged, he immediately returned to Weimar, and there, after having worn off, settled to study. The favourite pursuits of the Dutch literati extended his field of inquiry. On the one hand, the Hague being then a centre of an active diplomacy, his investigations regarding public law were enabled to assume a more practical to the real characters. The literary pursuits too of his new associates had more of the tone of society than those which prevailed in the German universities. On the other hand, the museums of Holland, and especially the collections of coins and other antiquities, attracted his attention. He found that all the antiquities of feudal law had in some measure prepared him. During his residence at the Hague he was indefatigable in his visits to all the museums and libraries, and in his study of the periodical literature, which opened in a way to his mind a new field of inquiry. He formed himself the considerale collection of coins and antiquities. While thus engaged, and projecting a tour through Spain and Great Britain, he was seized with a violent illness, which interrupted his pursuits.

On his recovery he rejoined his brother, and was employed by him at various times to conduct actions for him in the courts of Darmstadt, Stuttgart, and Cassel. He was induced about this time by the fair promises of a Livonian nobleman to undertake a journey in his company to Stockholm, for the purpose of obtaining a more intimate acquaintance with the antiquities of Scandinavia. Struve with this view proceeded to Hamburg, where he was to be joined by his companion. The count not making his appearance however, he returned to Hamburg, and thence proceeded to Sweden. To Wetzlar, for the purpose of obtaining, by attending the sessions of the imperial court, a more accurate knowledge of the practice of public law. While thus engaged, he was attacked by a more severe illness than the preceding; and some of the symptoms induced him to desist for some time, from pursuing his studies, and to quit the university and his return to Jena, his mind, however, being stimulated to greater activity and familiarised with objects of greater reality and importance than that had previously engaged his attention, had been dissipated and distracted with
their multiplicity. To the end of his life he occasionally expressed regret that he had not, in compliance with the request of his father, remitted his contributions to the direction his collections for a commentary on the law of marriage, an occupation which must have contributed to give him more precision and more command over his thoughts. On his return to Jenae, Struve found one of his brothers eagerly engaged in pursuit of the philosopher’s stone. He was of a facile disposition, as is apparent from an anecdote he relates in the Life of his father, of his incurring a rebuke by undertaking to solicit privately for a person whose conduct he disapproved of, another’s service. The young Struve, at first led him to join in his brother’s experiments, but the frehey seized him in turn, and he was soon as zealous an adept as the other. As might have been anticipated, the search after the secret of making wealth ended in beggary both. The brother was consigned to a place of servitude, Struve selling the collection of curiosities he had made in Holland, and even a part of his wardrobe. To the intoxication of his golden dreams succeeded a state of miserable destitution which lasted for two years. He secluded himself from society, and absorbed himself in the study of the Scriptures and the theological writings of Tauler and Arndt.

When he recovered his elasticity of mind, he found himself unable to encounter the expense of following out his intended medical career to which his father had destined him. Some time elapsed before any prospect of employment opened to him. In 1692 he published at Frankfurt on the Main some notes on the legal duties of Godfrey Freus (known subsequently as G. Freus, 1620–1703), a younger brother, his father’s second son, with a promise of a larger work in the future, according to his pupils desired, in physics, the elements of the Greek language, Roman antiquities, or history. The number of young men who attended him excited the envy of his fellow-college. He was urgently solicited to give him the active enunti of Schubart. It was found necessary to provide himself with a legation as teacher; and for this end he, in the year 1702, took the degree of Doctor of Law and Philosophy at Halle, the usual fees being remitted at the instance of the University. As soon as he obtained his degree, he took measures for having himself enrolled as Doctor Legens at Jenae, and his subsequent career was one of uninterrupted success. On the death of Schubart, he was appointed to the chair of his predecessor, and by the year 1704, by publishing a programme De Vitis Historiarum, and delivering a public oration De Meritis Germanorum in Historiam. His fame as a public teacher attracted many of the young nobility from all parts of Germany, and the young prince of Herzog von Weimar. Having received, in 1715, an invitation to the university of Kiel, he was induced to decline it by the patrons of Jenae conferring upon him the office of historiographer to the university, the rank of councillor, and the appointment of extraordinary professor of law. He was promised the succession to the ordinary professorship of feudal law, which he actually obtained a few years later. In 1717 he was appointed a privy councillor by the reigning prince of Baireuth; and in 1720 he received the same compliment from the Saxon court. He repeatedly filled the office of Dean in the Philosophical Faculty, and was thrice chosen rector of the university. He died on the 24th of May, 1738, having nearly completed his sixty-seventh year. Struve was the first to export German literature to America. He was united to his first wife, Anna Elizabeth Bertram, daughter of an assessor in the court attached to the salt-works of Halle, in 1702, who died in 1706, leaving him two daughters. He married in 1717 his second wife, Elizabeth Stridel, daughter of the town-clerk of Naumburg on the Saale; the year of her death is uncertain; she left no surviving children. In 1724 he married Sophia Maria, widow of Ernst Friedrich Kittner, a clergyman in Quedenburg, who brought him two sons, who were his only issue by this marriage.

The published works of Burkhard Goethel Struve are very numerous. A complete list of them is given in the Acta Eruditorum of Leipzig, published in 1740. The following are the most important, either on account of their subjects and inherent interest, or of the indications they give of the progress and direction of the author’s studies:— Stru-

vius non Errans," Franc. ad Viad., 1691, 4to.; "Bibliotheca Philosophica," Lipsiae, 1705, 8vo.; "De Desideria in Obitum Susanne Berlichim, matris paetissimae," Jenae, 1699, 8vo.; "Didacie Saevedres Abriss eines Christlichen Politischen Prinzens," Jenae, 1700, 12mo.; "Antiquitatum Romanorum Studia," sive Ritus sacer Systema abso-

dalis," Jenae, 1727 and 1737, 8vo.; "Kurtzer Entwurf zur Einleitung zur Wissenschaft der Staaten von Deutschland," Jenae, 1735, 8vo. (the title of this work contains the term 'scientia statisticia,' the invention of which has been attributed to Achenwall); "Corpus Juris Gentium, sive Jurisprudentia Heroica ex Juris Naturae et Gentium Argumenta petitum, et innumeris exemplis ex actis publicis editis et ineditis, historiarumque monumentis, omnis aii illustratum" (this work occupied thirty years of his life); "Imperii Germanici, ab anno 1700, ad annum 1738, innumeris additionibus," Jenae, 1743, 4vo.; "Acta Eruditorum," anno 1730, publicata, Lipsiae, 1740; Ad Novas Acta Eruditorum qua Lipsiae publicantur Supplementa, Tomus iv., Lipsiae, 1742; "Ph. Manus Strevi-

um de Vitis et Scriptis G. A. Strevi," Jenae, 1705; Bib-

liothecarum Germaniae, xxii., Amsterdam, 1724 and 1738; Martini Lepini Bibliothecae Rerum Juri-

dicam, Lipsiae, 1757."

STRY, THE CIRCLE OF. The kingdom of Galicia is bounded on the north and north-east by that of Brzańsk in the south-east by that of Stanisławow; on the west by that of Sambor; and on the south by the kingdom of Hung- ary. Its area is 2172 square miles, and the population is probably not much under 266,000, of whom 13,000 or 14,000 are Jews. The whole circle is mountainous and it is only on the north-east and north-west sides that there are some small plains. The valleys between the mountains are however tolerably fruitful. The principal river is the Dniester, which however only flows through the north-east part of the circle, the Strý fries
into the Drinster near Zhyacow. There are numerous small rivers and torrents. Agriculture is not carried on to any great extent; the inhabitants grow however corn, rye, barley, and oats, and a considerable quantity of potatoes and flax. The forests are extensive, and the consumption of wood is very great, partly for the salt-works, and partly for the manufacture of charcoal. The cattle of all kinds was small, there being in 1817 only 4146 horses, 29,932 oxen, 35,392 cows, and 29,933 sheep. An official table for 1830 shows a very great increase, except in the number of sheep, viz. 10,044 horses, 47,491 oxen, 44,929 cows, and 21,621 sheep. There are no manufactu
tures.

Stray, the capital of the circle, is situated in a tolerably fertile and well cultivated country, on the left bank of the river Issel, which flows over which Stray. It is surrounded with walls and ditches, and is one of the best towns in Galicia: about half of the inhabitants are Jews. The population is about 6000. There are one Roman Catho
clic and one United Greek church, a synagoge, a castle, and several schools.

(Blumenbach, Gemälde der Oesterreichischen Monar
chien; Anonymous, Historisch-Statistischer Umris von der Oesterreichischen Monarchie; Oesterreichische National Encyclopädie.)

STRYCHNIA, a vegetable alkaloid obtained from the Strychnos Nux-vomica, in which it exists combined with the Ignac or Strychnic acid. Its properties are, that it is colourless, inodorous, crystalline, unalterable by exposure to the air, and extremely bitter. It is extremely soluble in alcohol, but in diluted alcohol it is to a certain extent soluble, and the solution by spontaneous evaporation yields crystals in the form of the octahedron, and of a square prism terminated by four-sided pyramids.

It acts like other alkaloids on vegetable colours, and neutralizes and forms salts with acids. It is extremely poison
ous and is readily fatal. It is advisable to build a dog, and a quarter of a grain produces a decided effect upon a man. As usually obtained, which is by a tedious and complicated process, it is probably mixed with some bruxia, another extremely powerful vegetable alkaloid.

It is copiously used in medicine.

STRYCHNIC ACID. This acid has already noticed, exists in the Nux-vomica in combination with strychnia. It is soluble both in water and in alcohol, and has an acid and pungent taste; it produces no change in the solutions of the salts of silver, iron, or mercury, but precipitates those of copper, of a green colour.

STRYCHNOS (from spagyricus), a name applied by Theophras
tus and Dioscorides to a kind of nightshade, and adopted by Linnaeus for a genus of plants belonging to the natural order Apocynaceae. This genus has been made the type of a distinct order by Blume, who has been fol
lowed by Link, D. Don, and others. The principal difference
ence that it presents from the order Apocynaceae, to which it is referred by Von Martius, Brown, and Lindley, is in its pei
te leaves and simple succulent fruit. This genus is characterised, like the former, by the presence of a large round fruit, which is abundantly poisonous to the species of Strychnaceae, is a climbing shrub, and is a native of Java, and is said to be the true Usnea-tree of that country. It is undoubtedly the most poisonous species of the genus, and yields the greatest quantity of strychnia. There are several other species which are called by the name of Usnea in various parts of Asia. The natives of Java prepare from this species one of the most deadly of the various poisons that are used by barba
rous nations, for producing death by the wounds occasioned by their arrows.

St. toxierea, Wooly, Urari, or Poison-plant of Guiana, has a climbing stem, thickly covered with long spreading reddish hairs; coarse, rough, 4-nerved, ovate, or oblong, nearly pointed, shining, white, with 3-5 nerves, and its round smooth berries containing many seeds. The flowers are small, and of a greenish-white colour, and are arranged in terminal corymbs. The fruit, when ripe, is of the size
and colour of an orange. Although the seeds of this plant yield an alkaloid, which is a deadly poison, the pulp of the fruit is greedily eaten by many kinds of birds. The wood of this plant is very hard and durable, and on that account is employed for many purposes by the natives on the coast of Coromandel and the inhabitants of native gardens. The medicinal properties of this plant, see the article on that sub
ject.
In Tobago an oil is expressed from the fresh seeds, which is used for burning.

The best analgesic of the seeds of nux-vomica is by Pello-

tier and Cavenou (Annales De Chimie et Physique, x, p. 124), who found—

Styrchnate (or iugurate) of stynchia, 0.4 per cent.;

styrchnate of brucia; wax; concrete oil; yellow colouring-

matter; gum; nux-vomica smooth; emery-powder, and
carbonate of

tartaric acid, and salt of potassium, in the ashes.

It is on the styrchnate of stynchia, and, in a less degree, 
on that of brucia, that the active properties of nux-vomica 
depend. Styrchnia can be separated and purified by the

process given so well by S. Wever.

Five pounds of the seeds yield sixteen ounces of a

waty extract, and ten ounces of an alcoholic extract, 

which however always contains some green concrete oil

soluble in ether.

Nux-vomica seems to exert a deleterious influence alike

over vegetables and animals; there is however a difference

of susceptibility to its action in different classes of animals,
since a much larger quantity is necessary to destroy herbi-

vorous than carnivorous animals.

The degree of effect is in proportion to the quantity employed, but it seems to be the same in kind, being confined to the gaulingonic system of nerves and the spinal cord, extending as high up as the medulla oblongata, and, according to Flourens, to the central ganglionic ageney, even though artificial respiration be maintained.

From some experiments of Segalas, it appears also to

exhaust the irritability of the heart; for in animals he

found that organ could not be stimulated to contract after being previously excited by artificial beating.

Nux-vomica differs from all narcotic poisons, by not

exhausting the sensibility. During the intervals of the fits

the sensibility is on the contrary heightened, and the facul-
ties acute. (Christian.)

Three distinct degrees of action may be observed from

the use of nux-vomica. In small doses the gaulingonic sy-

tem appears chiefly to be affected, and this so slightly, that

any phenomena are observed only in cases of disease, par-

cularly in hysterical and weak persons. The secretions are

increased, both of the intestinal canal, the lungs, the

kidneys, and of the skin, accompanied with an increase of

appetite and improved digestion.

It is the second degree of action that the characterisitic

effects are uniformly produced. In this degree the animal

experiences a feeling of weight and weakness in the move-

ments of the limbs, inducing him to remain at rest; while his

mind is restless, sad, depressed, and anxious for solitude and

darkness, as he is peculiarly sensitive to light, noise, or the

least touch. The tongue swells with fluid; and the breath-

ation of the dose, these phenomena are increased, and the

contact of any external body causes a feeling like an elec-

tric shock, the voluntary muscles are no longer under the con-

trol of the will, and the individual staggers on the least

attempt at walking. At the beginning of these occurrences

the pulse is hard and quickened; the gums, cheeks, and

eyes reddened, and the respiration more frequent; but

when the nervous system is more affected, the hardness of

the pulse subsides, the countenance becomes of a rosy

ashiness, the eyes sunken, and the respiration shallow and

indistinct, breathing is labarous, and accompanied with

violent spasms of the larynx, and the other muscles of re-

spirations are irregular in their action. After these symptoms

have lasted six or twelve hours, they cease, and a great increase of the respiration is observed to follow, accompanied with the

skin, with much perspiration, even accompanied with

an eruption of vesicles or large blubs: the secretions of the

serous membranes, of the kidneys, and of the mucous mem-

branes are sensibly increased; the skin becomes warm, and

indistinct, becoming bloody. During this period the patient

complains of heat in the stomach and throat, of thirst, of foul taste, and

eructed rancidions, with nausea, and occasionally vom-

iting. While the augmented secretions are taking place, the

appearance becomes more promiment, and articular pains are

felt a few days the sufferers recover entirely from the debility and

excessive sensibility.

The third degree of action manifests itself by tetanus and

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asphyxia, occurring in single paroxysms, alternating with paralytic torpor. The paroxysms become longer, and the remissions shorter, in which however, till death close the scene, the intellect remains unaffected. While the voluntary muscles are entirely withdrawn from the control of the will, the pulse sinks and becomes slower, the breathing more and more laborious (the external muscles of the chest may also be paralysed, but this is better betrayed according to an experiment of Woper, the diaphragm par- takers of the spasm of the external muscles. 'Christison.) The belly swells and exhibits blue marks, the countenance is livid, and in a paroxysm of tetaic rigidity the breathing becomes almost suspended. In the meantime the intestines continue for some time; and, if an artery be opened, black carboconce blood issues. ' Death however does not always take place by tetanus: in some cases the departure of the convulsions has been followed by a fatal result. Vomiting is occasionally the result of the intestines continue for some time; and, if an artery be opened, black carboconce blood issues. ' Death however does not always take place by tetanus: in some cases the departure of the convulsions has been followed by a fatal result. Vomiting is occasionally the result of the action of the heart, through the medium of the nervous system, of long continued pain (Alison's Pathology); or more probably, according to Dr. Marshall Hall (Diseases of the Nervous System, and Guttsonian Lectures), to what he has designated Guttsonia. Or the individual may suffer an attack, after the primary symptoms have subsided, of inflammation of the stomach and intestines, which may or may not prove fatal.

Vomiting does not always occur, though the name would seem to denote the chief symptom of this system. Nux-vomica is important not only for its formidable properties, but for the illustrations it furnishes to certain physiological doctrines. Thus when used in cases where a portion only of the body is paralysed, it excites convulsions in the paralyzed part, and before any action is observable in the sound parts. The paralysed parts are the seat of tetanic shocks, and of a prickly sensation, and of a perapsulation, which is not observed elsewhere. In hemiplegia the sound side of the body remains tranquil, while the affected one is the sole scene of action: the tetanus is more rapid, and an abundant exudation takes place. Even an anomalous eruption has been observed, while the healthy side has been perfectly free. One side of the tongue is sometimes sensible of a decidedly bitter taste, which is not perceptible on the other. If the dose be augmented, both sides become the seat of tetanic action, though not equally so.' (Magendie.) It is also very remarkable that the contact of any external body with any part of the frame of an individual under the influence of nux-vomica which is supposed to be originating from the latter, immediately excites convulsive actions. It is thus thought to support the notion of a distinct or reflex function of the spinal chord. (Marshall Hall's Lectures on the Nervous System, and Guttsonian Lectures.) On the Spinal Chord. Certain sensations are felt by persons poisoned by nux-vomica, whether the seeds or bark (false Angustura bark), the mere act of touching the skin to feel the pulse has excited again the convulsive motions. Of these two phenomena, viz. the action of strych- nia on the paralysed limbs previous to causing any obvious effect on the sound organs, and of the contact of an extraneous body exciting the tetanic throes, the following explanation has been given by Mr. Grainger:—"Strychnia acts by preference on the paralyzed limb or limbs, because the con- tact of the seeds or bark, with the skin, immediately departs from the chord be divided, the pure spinal power remaining, when the skin is touched the limb is retracted, and must be retracted, because the cerebral control is wanting. So when the spinal chord is stimulated by strychnia, it must act on the limb or limbs from which the cerebral power is withdrawn." Nux-vomica acts most rapidly when introduced into a vein, and in other instances in the ratio of the absorbing power of the part; but it produces no effect when applied directly to a nerve or to the brain.

In fatal cases the morbid appearances vary according to the period at which death occurs. When death results from asphyxia, the brain is gorged with blood, and the texture suffer than natural. When death takes place at a late period, some appearances of inflammation are found in the stomach and intestines; but frequently these are absent. A tetanic stiffness remains in the corpse, till decay commences: this state of rigidity however, does not invari- ably occur.

The powerful properties of nux-vomica, and the rapidity of its action when administered in the state of a pure alkaloid, strychnia, or its salts, have deterred medical men from making so extensive a use of it as its therapeutic qualities entitle it to. The necessity for care in its administration is manifest from the fleeting manner in which a single instance, namely, from a woman grating cheese with a file which had been previously used to rasp seeds of nux-vomica; and in another instance, death ensued from three grains of the alcoholic extract taken at once. The consequence of a mistaken dose in the latter instance is well known, and it is generally employed only as a last resource, instead of being used at an earlier period. It might however be beneficially used, with due caution and careful superintendence, in many cases of hysteria and hypochondrias, dependent on irregular state of the nervous system, for the treatment of this repeated hysteric paralysis, accompanied with greatly impaired sensibility, it would be more influential than any other agent in a disease at once tedious and distressing.

In paralysis it has been found beneficial than most other remedies, though success has not always attended its employment. It is certainly better suited for some forms of paralysis than for others.

It is most serviceable in cases of paralysis of parts which are still sensible, more especially after an attack of the tetanic chord. Hence it is more serviceable in paralysis than in hemiplegia, in palsy of the bladder, of the rectum, and even in some cases of chronic diarrhoea dependent on atony of the intestines. It is more serviceable in the palsy which follows the use of other poisons, severe tetanics, or the use of iron, and in those which result from effusion of blood. (See Dr. Bard- sley's Hospital Facts.) Its use is altogether improper immediately after an attack, and in cases where there is no paralysis. If administered, it should be avoided during the first stage of convulsive twitchings in the limb, while the rest of the body is un- affected.

Thougth nux-vomica is not, strictly speaking, a cumulative medicine, it is undoubtedly of this class. Certain cases of comatose insensibility, and then, and upon resuming the employment of it, to return to a small dose, and not employ such a quantity as the patient had already taken; for it must be borne in mind that a person who has once been under its influence is more easily affected than a person using it for the first time. It was conjectured by Bahta, and it has since been proved by Dr. O'Shaughnessy, that the false Angustura bark [Galipea] was the bark of the Styrchnos nux-vomica; so that in case of poisoning by that article, the same mode of treatment would be used as in poisoning by nux-vomica or strychnia.

In cases of poisoning by nux-vomica, the most prompt treatment is necessary, and still more so if any of the soluble salts of strychnia shall have been taken. Nux-vomica acts by preference on the paralysed limb or limbs, because the contact of the seeds or bark, with the skin, immediately departs from the chord be divided, the pure spinal power remaining, when the skin is touched the limb is retracted, and must be retracted, because the cerebral control is wanting. So when the spinal chord is stimulated by strychnia, it must act on the limb or limbs from which the cerebral power is withdrawn.'
vital stimulants or sedatives are often sufficient; and for this purpose, wine, brandy, or a mixture of acetic acid and laudanum, or laudanum alone, will relieve the present danger. Conium or its tincture offers probable means of antagonising the action of strychnia, as suggested by Dr. Periera. It is said that the leaves of the Feuillea cordifolia furnish an antidote to nux-vomica and strychnia, which, however, has been, more than once, contradicted by experience, the danger not being entirely removed, though the spasms may have subsided, and the respiration become easy. Inflammation of the stomach may supervene, which will require quinine, using any treatment, or, in extreme cases, stomachia or astringent, or steal on, and destroy the patient. To prevent this last occurrence, great watchfulness is necessary, especially during the night, and the patient should be frequently awakened, and made to drink freely of green tea. But perhaps the most potent, and effectual sedative of all others would be the uræ poison from South America, as suggested by Mr. Morgan. (See Morgan’s Lecture on Tetanus, p. 31.) The preparation of this substance, which has been an object of curiosity and interest since the time of Sir Walter Raleigh, has been fully detailed by Mr. Schomburgk. (Annals of Natural History, vol. viii.) It is an article of much importance to the natives of Guiana, as much of their means of subsistence depends upon their possessing this poison, in which to dip their arrows for the chase. This poison, which is obtained by the Indians, is sold and used by themselves on its valuable properties, preferring it, with some show of reason, to gunpowder. ‘I know,’ said the anno del curare (master of poison, or Indian, who knows how to prepare it), ‘that the whites have the secret of fabricating strychnia, but this is not a secret, as the effect of making a noise, and killing animals when they are wanted. The curare, which we prepare from father to son, is superior to anything you can make down yonder (beyond sea). It is the juice of an herb, which kills silently (without any noise or bang when it enters the body), and as quick as the effect of making a noise, and killing animals when they are wanted. Arrows dipped in it have been known to retain their poisonous properties for twenty-seven years. (Ibid, in Medical Gazette, vol. xx., p. 261.) The poison when inspissated may be rendered liquid by heat, and is soluble in water, in alcohol, in hydrochloric acid, and in volatile alkaline spirit. It unites with acids without emotion or change of colour. If it be made into a syrup, it has no effect as an elixir, but it changes its colour from a dark-brown to a yellowish-brown. It possesses a remarkable influence over the blood, after it is taken from a vein. ‘A few grains, mixed with as many ounces of human blood as you please, entreats the removal of serum and crassamentum, and the whole mass continues in a state of fluidity similar to that in which it was drawn, until, after some days, it putrefies.’ (Baneroff.) This property seems to point out the propriety of employing in diabetes, in which the separation of the serum from the corpus, while the blood was yet in the body, was one of the most remarkable symptoms of that disease. Dr. Hancock is of opinion that it is one of the most potent sedatives in nature, and, could it be rendered by this case and manner, would be of incalculable value in the treatment of spasmodic and convulsive disorders. That there are means of controlling its action he was fully persuaded; and such, it appears, are adopted by the Indians of the Rio Negro and Amazon, where it is much used. They chop the bark into small pieces, birds, &c., and after bringing them to the ground, they took means to resuscitate them, and thus carry on a profitable trade with Grand Para and the Brazils. (Medical Gazette, vol. xx., p. 261.) The flesh of animals, birds, or fish which have been killed by these poisoned arrows, possesses no deleterious properties when eaten, but is thought to be more delicate than when killed by other means. Like the poison of the viper, which is only noxious when injected into a wound, and which may be swallowed with impunity, the urine may be taken into the stomach with perfect safety. Its taste is an agreeable bitter, and it has a tonic and febrifuge effect, frequently proving a valuable cure in intermitents. It, as well as the venom of the viper, seems to be disarmed of its virulence by undergoing the process of digestion.

When inserted into a wound, shortly after a quantity of the ‘shittick’ poison, prepared in Java from the Strychnos Tuelé (Upas Tuelé; see Sir Stamford Raffles’s History of Java: Dr. Hooker’s Planta Javanicae Rariorum, part 1, and Annales de Chimie, vol. xxx., p. 389), was removed, it excited the convulsions excited by that active agent. (See Morgan’s Lecture on Tetanus.) The uræi acts upon the brain, producing simple suspension of its functions, and a state of opium by artificial respiration, this state may be recovered from, if the dose has not been too strong, and other circumstances are favourable. (See Brodie, in Philos. Trans., xxi. ed., p. 244.)

The shittick poison contains strychnia only, unaccompanied by brucia, and therefore more rapid in its action than any other strychnos. On account of the difficulty of preparing the alcoholic extract of nux-vomica of uniform strength, strychnia, or some of its soluble salts, is now generally substituted for it, as these admit of easy sub-division. The preparation of strychnia has been used in some cases with great advantage (See Gaskin, in Med Gaz., vol. x., p. 316); so also the acetate: but a form of preparation which has proved of service in some long-standing and almost hopeless cases of epilepsy and strychnia. (See Magnelie, Formulare, 8ieme ed., p. 244.)

Care must be taken that the strychnia be pure, as a spurious article is vended in France, which contains no trace of strychnia. Chloride of mercury is a good test for the discovery of this poison. The administration of the acetate of strychnia: but the addition of hydrochloric acid causes a white crystalline precipitate. Sulpho-cyanide of potassium appears to be the best test for strychnia. (See British Annals of Medicine, vol. i., p. 190.)

Strychnia is also prepared from the black seeds, in which case it is diffcult and expensive to separate it from the brucia, or it is obtained from the St. Ignatius Bean, in which it exists in about three times larger quantity than in nux-vomica. It is also, but rarely, procured from the Strychnos Cordulina, in which case, it is obtained furnished by the Strychnos Tuelé, but the rarity of this substance is a practical obstacle to its employment.

Sneak-wood. Many substances, in countries infested with serpents, are reputed to be efficacious in counteracting the poisonous bites of these reptiles: one of the most celebrated of these is the root of the Strychnos Cordulina. The strychnia probably acts as an antagonist to the stimulating effects of the poison of the snake, just as arsenie does to the poison of the Coluber cainarius of the West Indies. (Aes n. 8.)

Strychnos Potaorum, called also S. Tettan Cottay, or Clearing-nut, is a native of India, and is a larger tree than any other species. It is devoid of noxious properties. The fruit, though rather hard and astringent, when dried, preserved, and eaten, is reckoned emetic by the native doctors. The chief use made of it is to rub the seeds hard for a short time round the inside of an earthen pot, into which water is poured, and in a short time it becomes clear, tasteless, and wholesome, however much it may be putrid; or putrid it may have been: hence its name of clearing-nut. Officers and soldiers, before setting off on a march, provide themselves with a store of these, as water purified by such means is deemed more wholesome than that clarified by alum. The bitter is said also to oblige the Slider to the muddy waters of the Nile quite clear and drinkable by rubbing bitter almonds on the inside of the earthen jars in which the water is kept. (Niebuhr’s Travels, vol. i., pp. 71, 72.)

Strychnos Pseudo-china, Quina do Campo, or Field China, is a native of Brazil (St. Hilaire, Plantes Unices de Brazil, t. 1.), and is devoid of strychnia or brueca. It is a remedy of the Sertanejas, being peculiarly fitted for those cases to which the true cinchonias are unuitable. The taste is at first faintly aromatic, then astrigent, and at last slightly bitter. It has no colour. In its properties it resembles Quassia, Menyanthes, or Gentian more than the true cinchonias, with none of which, except the Humilla bank, could it readily be confused in its physical charac-
STRYGOEBPHALUS. [BRACHIPODA, vol. v., p. 312.]

STRYMON. [AMPHIOCE, MACEDONIAN.]

STURMY, JOHN. The Memoirs of Mr. His Life and his first acts of...and even occasionally, to leave his narrative imperfect by the omission of some particulars which would not have escaped a sharper intellect. We believe every reader or conquirer of Strype will have found himself annoyed occasionally by this absence, amid a multitude of superfluities, of the one thing needful. His books however are all curious and valuable for the quantity of information they contain never before published, and not to be eluded. One may consider as forming, along with Burnet's History, and even in some respects in a higher degree than that, the foundations of the history of the reformed Anglican church.

STUART FAMILY. The origin of this family is briefly stated under Robert II. of Scotland; and the list of kings of Scotland of this family, from Robert II. of Scotland to James VI. of Scotland and I. of England, is given in the article SCOTLAND. The Acts of Settlement, passed in the Reign of the last of these, were the great success of the House of Hanover to the throne of England, and the descendants of James II. were subsequently excluded from the throne of Scotland also. [GEORGES.] The chief historical interest that attaches to the House of Stuart after the abdication of James II. is that it is the earliest of the invasions of Great Britain by his son and grandson, who are often respectively called the elder and younger Pretender.

STUART, JAMES FRANCIS EDWARD. On the 16th of September, 1701, James II. died; and his son James, Prince of Wales, became立 in 1644. In the Life of the Learned Sir Thomas Smith, principal Secretary of State to Edward VI. and Elizabeth; wherein are discovered many singular matters relating to the State of Learning, the Reformation of Religion, and the Transactions of the Kingdom during his time; that, in 1701 by another octavo volume entitled 'Historical Collections relating to the Life and Acts of Bishop Aylmer' (or Aelmer, who filled the see of London from 1577 to 1594) and that by his 'Life of Sir John Harington' London, 1706, a single sermon in 1708; and the next year he brought out the first volume in folio of his 'Annals of the Reformation and Establishment of Religion,' comprehending the first twelve years of the reign of Elizabeth. Before proceeding further with this work, he produced three more biographical fascicules as companions to his Life of Cranmer: his 'History of the Life and Acts of Archbishop Grindal,' in 1710; his 'Life and Acts of Archbishop Parker,' in 1711; and his 'Life and Acts of Archbishop Whitgift,' in 1716. Then, during the latter part of the field of antiquity which came forth, in 1720, with his new edition of Stow's 'Survey of London,' in two bulky folios, of which we may safely say that nearly three-fourths consist of his own additions.

STOW. The next year, 1721, was published what may be regarded as the ablest work of the remainder of his life; the Transactions of the Kingdom, relating chiefly to Religion and the Reformation of it, and the Emergencies of the Church of England, under King Henry VIII., King Edward VI., and Queen Mary I., in three volumes, folio. Of this work a new edition, though limited, we believe, to a very small number of copies, was brought out at London in 1816, in seven volumes, 8vo. But Strype's labours were not yet closed: another single sermon, in 1724, ushered in a second edition of the first volume, 1725; and that work the same year, bringing down the history of the Church of England to A.D. 1580; a third in 1728, embracing the period from 1581 to 1588; and a fourth, in 1731, consisting however only of a collection of papers, which the author found in two years and a half, without on reducing into a narrative, in illustration of the remainder of the reign of Elizabeth.

Strype probably spent the first fifty years of his life in collecting the materials of the voluminous works which he gratified authors of succeeding ages. His labours have been a consistent for the great part of masses of original papers, even so much of them as has the form of being his own composition scarcely ever evening any real digestion of the materials, and even occasionally, with all his tediousness, to leave his narrative imperfect by the omission of some particulars which would not have escaped a sharper intellect. We believe every reader or conquirer of Strype will have found himself annoyed occasionally by this absence, amid a multitude of superfluities, of the one thing needful. His books however are all curious and valuable for the quantity of information they contain never before published, and not to be eluded. One may consider as forming, along with Burnet's History, and even in some respects in a higher degree than that, the foundations of the history of the reformed Anglican church.

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STUART, JAMES FRANCIS EDWARD. On the 16th of September, 1701, James II. died; and his son James, Prince of Wales, became the king of Great Britain, contrary to his promise to King William. The king of France was induced, as Tindal affirms, to take this step, chiefly by the persuasion of Madame de Maintenon, whom Mary of Modena had engaged, he feared, to prepare to invade England. The Pretender's claim was the ostensible reason for this attempt; and Louis, in a visit to him at St. Germain's, presented him with a sword mounted with diamonds, begging him never to forget that it was for the French king that he was engaged to investigate and pass over to the Frith of Firth; but he was taken ill of the measles, and the English fleet had time to get ready.

In the meantime, says Cunningham, 'the Pretender wrote to the French king for his directions what to do in this unhappiness. The English minister was more concerned about the Pretender's life and affairs than to serve his own turn, answered, that he must not desist from the undertaking nor delay his embarkation; and ordered some men thither to see him on ship-board, though he was hardly recovered of his distemper.' So the Pretender was Louis for the enterprise, that though the Pretender requested only a few days for the recovery of his health, Louis was peremptory, and the fleet put to sea. But this expedition was a fiasco, and the aversion of the Pretender to land in Scotland, partly from storms, which dispersed the French ships, partly from the reliance of the English admiral, Sir George Byng, but chiefly from the dissensions of Fourbin and Gare, who had the command, and the Frenchman, Sir John Harington, the Pretender on board, to Dunkirk, and the disappointed prince obtained permission of Louis to engage in the campaign in Flanders. In commemoration of this expedition a medal was struck in England, and the price of these medals was fixed at 20s. It was the last coinage under the English parliament. On the 11th of July, 1708, the Pretender was stated by French writers to have been in the battle of Oudenarde, which was gained by Marlborough; but it seems to the accounts of Dutch historians, he confined himself to the observation of the battle, with other Frenchmen, and returned to his residence in a neighbour's house at Huyzengroen, and consulted his safety by a timely retreat.

In 1713 the Pretender published a protest which he forwarded to the ministers of the different states at Utrecht.
declaring that he could not 'by his silence seem to consent to what was transactions to the prejudice of him and of the lawful heirs of his kingdom'; and that, finding the confedrate powers had no regard to his rights, he solemnly pro-
tested against all that might be agreed on to his prejudice.
No notice was publicly taken of this protest; but the Pre-
tender's friends in England were indefatigable in strength-
ening his favour with the Queen. The jealousy which Anne cherished of the pretender and his adherents, was now ex-
pressed in a manner that might be regarded as criminally prejudicial, when it was proposed that the Electress Sophia should re-
side in England, strengthened for a time the influence of Lord Bolingbroke. But the Pretender's stronghold was in the affections of the queen. It had been surmise-
ted to her that the Pretender had again landed in Scot-
land in 1708. Upon the death of Queen Anne, James, who had been residing at Bar-le-duc, posted to Versailles, where he met with an ungenerous reception from Louis 
XIV. and his court. It was the same to the queen. James had been joined by some Scottish horse. Their numbers were now increased by recruits, who joined them at different towns, and the influence of the earl of Derwentwater, a Jacobite 
man, served to strengthen the Pretender. The earl of Newcastle stood firm, and the rebels, hearing that they 
were to be attacked at Hexham, withdrew from that place, 
having first proclaimed the Pretender. On the 12th of Oc-
tober the standard of James VIII. of Scotland was set up at 
the foot of dragons and volleys, finding it impossible to dis-
lodge them without artillery, was obliged to retire.
On the 27th of October the Highlanders at Seaston House 
marched southwards to Kelso, where they were joined by the 
English and Scottish horse from Nithsdale and Northum-
berland. Mr. Montagu had arrived at Newburn the day before, and was authorised to make liberal promises of assistance from France, and to declare that he came in the capacity of secre-
tary to the Pretender. It was now expected that all com-
munication would soon be cut off between the duke of Argyle 
and London; and the necessary arrangements were made to 
prevent their entrance in the capital, the rebels changed their course, and marched into Leith. They then retreated to Seaston House, an old castle about seven miles from 
Edinburgh, where the earl of Rothes, with a com-
mand of garrisons and volunteers, found it impossible to dis-
lodge them without artillery, was obliged to retire.
It was now that the 6000 men guaranteed by the Dutch 
in 1707 to be sent over to England were demanded by the British 
ministry, and granted by the States. Orders were issued to 
all the governors of seaports to examine all British sub-
jects who might attempt to pass from the Continent into 
England; for it was thought that the Pretender, with the 
help of the Dutch, would attempt to make an invasion from 
the Continent. On the 25th of October General Carpenter 
set out from Newcastle for Kelso, where the Ja-
obite army lay. The Jacobite commanders proposed to 
take the Tweed and attack Carpenter's troops, which were 
advancing towards Abingdon, but the earl of Argyll, on his arrival, marched to Jedburgh, and thence towards Dumfries, which 
they thought of investing. The duke of Argyll was at 
Stirling with so small a force, that unless he was soon joined by the Dutch or Irish troops, he could not save Dumfries. Everything 
seemed to favour the enterprise of the Pretender, but 
alous divisions in the Jacobite council of war frustrated their plans.
The earl of Wintoun, one of the insurgent leaders, opposed 
the siege of Dumfries, and the English officers urged a 
maneuver into their own country. Confidence was thus lost, and 
the men daily decreased. After some loss of time the rebels 
marched to Brampton in Cumberland, where the Pretender 
was proclaimed. They then proceeded to Perth, and thence...
on the 8th of November to Appleby; next to Kendal and Kirby Lonsdale, and on the 7th to Lancaster, which they entered without opposition. They left Lancaster on the 9th day of the month, for Preston, where they were joined by a number of gentlemen and others of the Roman Catholic persuasion, a circumstance which did not satisfy the Scottish chiefains and Highlanders, who had been led to expect that their forces would be augmented by the high church party.

General Carpenter was now pursuing the Jacobites, but with his dragoons only, in order to save time. He had communicated with General Willes, at Chester; and both generals were in concert, to prevent the attack of the rebels at Preston. General Willes reached Preston first, and found the town strongly barrieded. On the 12th of November Willes attacked the barricade below the Horse Tower, and gained, but the new barricade which were flanked with Highlanders, were not carried, and the king's troops were obliged to retire that evening. On the following morning General Carpenter and his troops arrived, and the town was completely invested. The Highlanders indeed were too weak to make a saltty, but they were not allowed to move. A capitulation was determined on, and Colonel Oxburgh went out with a trumpet to propose terms to General Willes. All however that he could gain was a promise that, if the rebels would lay down their arms, he would keep the soldiers he had left behind, and give them an hour to consider of it. No terms were finally made for the Jacobites. General Carpenter entered the town on one side, and General Willes on the other; and they met the rebel troops in the middle of the town, and the chief took his first undefended guard, and then their followers. The number of the English and Scottish prisoners of all classes amounted to 1489. On the same day that Preston surrendered, the battle of Dumblane was fought between the duke of Argyle and the earl of Mar. The Mar's wing, which fought bravely, was routed; and the duke of Argyle, after pursuing them to the river Allan, returned to the field, where both armies stood looking at each other; towards evening the duke drew off to Dumblane, and the enemy to Arrochar, where both remained for a day next following. Inverness was gained. This important advantage was the result of treachery. Lord Lovat had delivered it to the king's troops.

The principal persons among the rebels were sent to London. On reaching Highgate, they were pinioned with cords, and not allowed to hold the reins of their horses, which were led by a foot-soldier. The prisoners were conducted from Highgate to London, amid crowds of spectators, the rebels, though they were fighting a triumphant march. They were divided in different prisons; the noblemen were lodged in the Tower.

On the 22nd of December the Pretender landed at Peterhead in Scotland, with a train of six gentlemen, among whom was the earl of Tweedmouth. From Peterhead James proceeded to Newburgh, a seat of the Earl Marischal's, and passing through Aberdeen in disguise to Fettescor, he was met there by the earl of Mar, who had left Perth with a troop of horse. James now assumed the state of royalty: he formed court, and made several peers and created knights. He was also proclaimed with great ceremony before the house where he was lodging.

In January, 1716, the Pretender made a progress through the north of England, and once more reaching Dundee publicly, where the earl of Mar, on his right hand, and the Earl Marischal on his left. The people thronged into the market-place to kiss his hand. On the 7th of January he arrived at Scone, and on the 9th of January he made his public entry into Perth, and reviewed some of the troops. He expressed great pleasure at the sight of the Highland dress, which was new to him. In the evening he returned to Scone, where he formed a council, and issued six proclamations. On the 16th of the month, James haughtily his council, having previously received addresses from the episcopal clergy of Aberdeen. His council however, being convinced, after the arrival of the Dutch troops, that the army of the Pretender could no longer resist that of Argyle, had resolved to abandon the enterprise and disband the forces. But wishing to keep their design secret, they acted as if they meant to attack the English army. They began to raise batteries, plant guns, and even destroyed Auchterarder, Blackford, Denning, Muthill, and other places, to prevent their affording quarter and provison to the enemy. The duke of Argyle, having received supplies, marched through Auchterarder, to Tullibardine, whilst the Pretender and his followers retreated to Dundee. Suspicions now arose that the Pretender, together with the members of his council, intended to escape, and to leave the army to their fate; and the report gained ground when the Jacobite army was ordered to march to a point near which several French ships lay at anchor. The rebel troops, possessed with this idea, refused to move. The earl of Mar however succeeded in pacifying them, by the assurance that the Pretender was going to place himself at their head, and by declaring that it was intended to make a stand and wait before, and to add to the deception, the horses and body-guard of the Pretender were drawn out before the door of the house where he lodged. James, in the meantime, slipping out by a secret passage, entered on the evening of the 23rd, and proceeded to the sea-shore, where a boat conveyed the Lord Mar on board a French ship which was then in Montrose road. The boat returned, and fetched seventeen persons of rank, who were acquainted with the Pretender's design; on which the rebels resolved to set forth without delay. The vessel returned in twelve days: and, in spite of the utmost vigilance on the part of Argyle, a very considerable portion of the noblemen and others who were engaged in this unfortunate affair escaped to France.

In February James was in comfortable state for the Pretender and his friends. It was the interest of the duke of Orleans, regent during the minority of Louis XV., to maintain a good understanding with the House of Hanover. Lord Stair, the English ambassador, was urgent in this point; and, on his return from France, James was attended with the most friendly reception, and was allowed to remain in France. On his return from Scotland, James found it necessary to dismiss Lord Bolingbroke, who had acted as his secretary, on suspicion of treachery, and the place was filled by the duke of Ormonde.

The earl of Mar, the earl of Kenmure, and Derwentwater, of Carnwath and of Nithsdale, with lords Widdrington and Nairn, were tried at London. The prisoners of inferior rank were tried chiefly at Lancaster, where many were executed; one thousand of them, upon their petition, were transported to New South Wales. The numbers of those that perished were few.

The counties of Nithsdale and Lady Nairn, waiting their opportunity behind a window-curtain, threw themselves on their knees before the king, as he passed through the streets. The Pretender's palace, to beg for their husbands' lives. The king heard their appeal, but was not moved. Lady Derwentwater, with the Duchesses of Richmond and Bolton, were introduced by the dukes of Richmond and St. Albans into the royal bed-chamber, where Lord Derwentwater watched by her husband. On the 7th of March, the earl of Derwentwater and Kenmure were beheaded on Tower Hill; lords Widdrington, Carnwath, and Nairn were reprieved. The earl of Nithsdale escaped in woman's attire brought to him by his wife. The earl of Mar was condemned to death, but escaped from the Tower.

There were still however proofs of disaffection. On the 29th of May the Jacobites were oaken boughs; and on the 10th of June, the Pretender's birthday, they displayed white roses. At Oxford the spirit of disaffection was shown more plainly than in any other place. Alarmèd by these and other manifestations, in 1716, King George succeeded in forming an alliance with France and the States, the chief object of which was to crush the Jacobite cause. By this treaty it was agreed to dispatch a ship under the Pretender, to go beyond the Alps; nor was he to be permitted ever to set foot in France again on any pretext whatever. A renewal of that promise which had been made at the treaty of Utrecht was given; and all protection was withdrawn from James on the part of the French government. The Pretender removed into Italy.

In 1718 the Pretender became the instrument of Cardinal Alberoni's ambitious intrigues. Upon war breaking out between France and Spain, James left Urbino, where he had resided since his expulsion from France and went to Rome. He was there advised by Pope Clement XI. to go into Spain, where a squadron had been for some time fitting out against England. James was received with regal honours at Madrid; and the duke of Ormonde, one of his adherents, was appointed captain-general of the expedition which was to invade England, and was authorized to proclaim the Pretender's name at certain places. But a
storm dispersed and entirely disabled the Spanish fleet off Cape Finisterre; and a descent which the Spaniards made at Kintail in Scotland (June, 1719), although aided by the caitiff knowledge and defeated by misfortune. During the year 1718-19 a marriage was agreed on between the Pretender and Maria Clementina Sobieski, granddaughter of John Sobieski, king of Poland. This princess had a million sterling for her dowry, and was herself to be brought in a convoy, but whether Jewish or Protestant was to be determined; and on her way through Tyrol to Italy the princess was seized, and placed in confinement in Innspruck. Not being released, even upon the personal application of her father, she escaped from Innspruck in a canoe, went to Florence, and was then married by proxy to the Pretender, who was still in Spain. Two sons, Charles-Edward and Henry, were the offspring of this union. The earl and countess of Inverness were entrusted with the charge of the eldest, styled Prince Charles. They had consented to his being treated as a prince, with offence to their mother, and to Cardinal Alberoni, by whose counsels she was governed. After six years of married infelicity, or, as Maria Clementina terms it in her letters, of injuries and insults, she withdrew, in 1725, to the convent of a house of Mercedarians in Rome.

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The death of George I. produced no improvement in the fortunes of James Stuart, though there were continual cabals in his favour in Great Britain, and a treaty (called the treaty of Vienna) had been formed between the emperor of Germany and the king of Spain in 1725, with a view to the marriage of stadholder William and James Stuart. This document, which, amongst other articles, contained a proposal to George I. to resign his crown, was pronounced by the House of Lords to be a false, insolent, and traitorous libel, and was burnt at the Royal Exchange.

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turn their backs upon the Jacobite army, than a common soldier deserted, and carried the news to the other side. The Highlanders instantly put themselves into motion; and on arriving at Garramore, it was determined that they should march to the south, and enter the low country, thus endeavouring to get possession of Edinburgh before General Cope should arrive there. On the 30th of August they reached Blair Athol, and the duke of Athol, who was on King George's side, retired at their approach. On the 3rd of September they entered Perth, where the Pretenders were declared to be the legal sovereigns. At Perth great numbers flocked to the Pretender's standard. Among the most considerable were the duke of Perth, Lord Strathallan, and Lord George Murray, who was the younger brother of the marquis of Tullibardine, and had been induced to leave his estate by his attachment to the exiled Stuarts; his second brother, Lord James, now duke of Athol, having succeeded to his estates and honours. Lord George Murray was a brave, humane, and honourable man; and he possessed a sound judgment in military matters. Having accepted the act of grace which passed after the rebellion of 1715, Lord George was nevertheless not possessed of that entire confidence on the part of Charles Edward which he proved himself eventually to have fully merited.

On the 27th of August the prince himself, which in the Lowlands was not so cordial as he expected. On the 11th of September he marched from Perth to Dunblane; and, on the 13th, passed the Forth at the ford of the Frew, a few miles above Stirling. Colonel Gardiner's dragoons, which were posted near the ford,观测到 that his horse was missing. The rebels arrived within nine miles of Edinburgh, and Gardiner's and Hamilton's dragoons were posted within two miles of it. The city had been hastily fortified; a thousand men were thrown into the defence of the castle; and, behind the castle, trained bands of mixed Whigs and Jacobites were constantly on duty. Everything was so prepared that the town might have held out for some days before troops which had not a single cannon. 'But,' says an anonymous writer, 'the most brilliant successes of the Prince of Wales, the capital was given up to a handful of half-starved savages, without stroke of sword.'

On the 13th of September, being Sunday, public worship was suspended, and the volunteers were under arms all day. On Monday, the defence was reported to be carried on vigorously; but about two o'clock a petition was set on foot, praying the magnates and town-council to call a meeting of the chief inhabitants, to deliberate concerning the propriety of delivering the town up to Charles Edward. About this time the guards were marching towards the castle. On the gate being opened, a body of 300 Highlanders, under the command of Lochiel and Sullivan, rushed in: the lord provost and town council, who were waiting the return of the deputies in the street, on hearing of this event, retired to their homes. At noon, Charles, in a Highland dress, attended by the duke of Atholl and the duke of Elcho, came by Duddingston into the King's Park, and entered through St. Anne's Yard into Holyrood Palace. There was a great crowd assembled to receive him, and the young prince was one whose personal appearance might seem just to十足 an impression on which he was afterwards a temporary absence of Charles,' observes Mr. Home, who witnessed his entrance to Holyrood. 'Were not ill suited to his lofty pretensions. He was in the prime of youth, tall and handsome, and of a fair complexion.' As he entered the palace there was an expression of languor and melancholy in his countenance: the Jacobites compared him to Robert Bruce; the Whigs declared that he looked like a gentleman and a man of fashion, but not like a conqueror. After disembarking, the prince went to the apartments of the duke of Atholl, where he was near the door, a gentleman moved out of the crowd, drew his sword, and walked upstairs before the prince. This was James Hepburn of Keith, who had been engaged when very young in the rebellion of 1715; a gentleman who is said to have been a model of manliness, simplicity, and honour; but whose hatred of the Union, rather than love of the Pretender, induced him to sacrifice himself to a notion of national independence.

In the meantime John Cope had marched from Dumbarton to Haddington, and thence to Prestonpans and Seaton. The Highlanders were then believed to be at Prestonpans, under the command of Lord George Murray, to whom General Cope had proposed to engage General Cope's army. This was agreed on; but when the prince declared his resolution to lead the troops to battle himself, the chiefs remonstrated, and with some difficulty induced him to give up the command to one of the most skilful of his officers. The Highlanders advanced to Tranent; and to the west of the town continued their march until they saw the king's soldiers encamped near Preston. A loud shout was raised by the English, and returned by the Highland troops. A morass, it was pronounced, to be impassable, divided the armies. The afternoon was spent in movements. At night both armies lay down to repose, the Highlanders with the resolution of attacking the king's troops early in the morning. During the night, a country gentleman, who knew the ground well, visited the prince, and pronounced it impracticable to have attacked the morass whence the rebels might attack their enemies without observation. Lord George referred him to Prince Charles, who was sleeping on the ground with a sheaf of peas-straw under his head. Charles was pleased with the proposal, and gave his consent. They marched through a sort of valley, or hollow, concealed by the darkness first, and afterwards by a mist. Charles took his place between the first and second line. At length the sun rose, and the morning light shed a glow on the camp, and was reflected by a corn-field. The Highlanders, ill armed and without cannon, followed up the advantage which they had gained with wonderful success. A panic seized the king's troops. The Highlanders threw down their musquets, drew their swords, and rushed upon the enemy in a wild manner. 'In a very few minutes,' says Home, 'after the first cannon was fired, the whole army, both horse and foot, were put to flight. Not one of the soldiers attempted to reload their musquets, and not one bayonet was stained with blood.' All the king's infantry was killed, and his horse, by a single charge, who escaped by great speed, or other good fortune. This was called the battle of Prestonpans.

The second line of the Highland troops, commanded by Prince Charles, had kept so near the first as to appear to be a single body. In about ten minutes they showed him a place behind the vanguard—a proof of courage which his enemies could not deny; but it was a departure from his agreement with the chiefs, who had made conditions that he should not expose himself to imminent danger.

General Cope was now censured; but when inquired into by a board of general officers, he was not censured, and the conduct of the soldiery was made to bear the blame. 'His great error,' observes Sir Walter Scott, 'was in drawing up his forces in front of a high wall park, which barred their escape, depriving them of light, breath, and food. Collecting his dragoons, Cope, with the earls of Loudon and Home, marched to Berwick, where Lord Mark Ker received him with this sarcasm, 'that he believed he was the first general in Europe that had brought the first tiffings of his own defeat.'

Great apprehension was now entertained in Edinburgh lest the prince should immediately march southwards. But Charles and his council did not deem it prudent to appear in England, or to send any independent party to show him a handle to his incursions, and some time longer at Edinburgh. The castle of Edinburgh remained still in the possession of the king's troops, commanded by General Guest. At first the garrison was supplied with necessaries from the town, but on the 29th of October, owing to the state of the roads, it was necessary to send one thousand men into the castle. A letter was that evening sent down by General Guest to the provost of Edinburgh, declaring that unless a free communication was opened with the garrison and the town, the general would commence a cannonade upon the castle, and the people of Edinburgh. In case of this threat, ordered the communication to be re-opened. But the Highlanders having, on the 1st of October, fired on some people who were carrying provisions to the castle, the garrison on the next day began to fire on the houses that covered the prince's highland guard. Upon this a contest...
commenced between Prince Charles and General Guest, during which several houses were set on fire, and several persons on both sides killed. The cannonades lasted till the evening of the 5th of October, when Prince Charles at last, after two days’ negotiation, permitting a communication between the town and the castle. Very few of the inhabitants of Edinburgh joined the Pretender during these destructive reprisals. There was, in fact, a disaffection among the common people to flock to his standard. Lord Kilmar-
ston and the Earls of Loudon and Loudon, who then arrived at this time joined the prince, and Lord Ogilvie, eldest son of Lord Arl, arrived in Edinburgh with a regiment of 600 men. These additions, and reinforcements sent west by a few other gentlemen, chiefly in the neighbourhood of the Highlands, together with supplies of arms and ammunition from France, strengthened the prince’s cause.

It was now discussed by the prince’s council in what manner to attack the English forces, the man, who was totally unacquainted with the country which he had invaded, could not bear opposition, nor listen to advice. Feuds and intrigues divided his little court; and too great confidence in his own opinion made him single out General Hawley, of whom he was, of course, cautious. Having received all the reinforcements that he expected, he one day suddenly apprised his council that he was resolved to march to Newcastle, and to oppose the progress of Marshal Wade, who had advanced to that town. It was the 2nd of November, the 3rd of the month, and the 20th of the year 1643. Three times it was brought before the council, and on the last discussion the prince settled on these words: ‘I see, gentlemen, that you are determined to stay in Scotland, and defend your country; but I am also resolved to march to Newcastle, and make war upon the English.’

On the 31st of October, Charles marched out of Edin-
burgh, leaving Lord Stratallan to command in Scotland. At Dalkeith House he was joined by the clan Macpersion and some other Highlanders, amounting in all to about 1,000 men. With one division of his army the prince marched to Kelso, then taking the Jedburgh road, he crossed the Esk, and on the 8th of November reached Brampton in Cumber-
land.

On the next day the other division arrived, and proceeded to invest Carlisle, which surrendered to the duke of Perth on the 15th of November. It was now determined to march directly to London. Before Charles had set foot on English ground, three armies, comprising the millions of the common people. These men, the only Englishmen who joined the standard of the Pretender, were called the Manchester regiment, and were commanded by Colonel Townley, a Roman Catholic. Preston and Manches-
ter were the only places where ringing cannonades were heard. The Pretender, who had opposed his determination, had to have been commanded either by the king or the Earl of Stair. The rebel troops nevertheless leaving a gar-
ison in Carlisle, marched forward in two divisions: the first, commanded by Lord George Murray, arrived at Penrith on the 5th of November, and continued to march, while the second, under General Hawley, who had retired during Charles’s absence, marched to Carlisle; and so it was now that the army was only seven miles distant from that of the Pretender. Lord George Murray marched at the head of the Macdonalds of Koppick with his drawn sword in his hand. The Manchester regiment, which he had received, was the king’s dragoons. ’When the Macdonalds came near the foot of the king’s army,’ says Home, ‘some regiments of the first line gave them a fire; the rebels returned the fire, and throwing down their muskets, drew their swords, and attacked the regiment in front, and the left of the second line, and the front and flank; all the regiments in the first line of the king’s army gave way; as did most regiments of the second line. It seemed a total rout; and for some time General Hawley did not know that any one regiment of his army was standing.’ General Hawley retreated to the rear, and saw seven pieces of cannon and a quantity of provision, ammuni-
tion, &c. upon the field. A strong body of Highlanders, commanded by Lord George Murray, immediately took possession of Carlisle.

The friends of the House of Hanover were greatly dejected on hearing of the defeat; whilst the generals of the rebel party deemed it incoherent, and blamed each other. Charles remained at his quarters that night, and on the following day returned to Inverness. The news of Stirling Castle proceeded slowly, owing to the superior fire of the castle. On the 30th of January the duke of Cumberland arrived at Inverness, whether General Hawley had retired; and on the following day the duke marched against the city. The Prince of Wales was now at Falkirk, and Prince Charles was still in the house of Bannockburn. The rebels at first resolved to make a stand, and to give the duke battle; but on the following morning they suddenly raised the siege of Stirling Castle, to retreat. Lord Loudoun’s men, deceived by these event which reached the duke’s ears; these were the powder-magazines blown up by the Highland troops, who retreated in disorder over the river Forth.

The Highlanders marched through Dunblane to Crieff, where the two divisions of their army separated: one, under Prince Charles, marched north by the highland road; the other, commanded by Lord George, proceeded through Montrose and Aberdeen, by the coast road, to Inverness, where they joined both with the Prince of Wales and each other. Charles, suffering his men to struggle about, lodged at Moy, the seat of Mackintosh, about ten miles from Inverness. Here he was saved from a surprise by the presence of a man of a woman. Lord Loudoun, who had set out at Inverness on the 1st of February to join them, Lord Loudoun’s men, deceived by these events, retreated precipitately to Inverness, and many of
them were trampld down in the confusion of their flight. Charles, on the following day, hearing of this skirmish, which was called the Rout of Moy, marched to Inverness.

Upon Lord Loudon retreating, he laid siege first to Fort George, and next to Fort Augustus, both of which places he captured. During the months of February and March a desultory war was carried on, until, at the end of March, news was brought that the duke of Cumberland was marching towards Inverness with all his forces. On the 14th of April, Charles retreated from Inverness to Nairn, where he again made a stand. He was, however, driven from his position by the superior numbers of his enemy, and the baggage and trees of Culloend wood, about three miles from Nairn.

The prince's army was now much dispersed, and many of his best officers were absent. The Master of Lovat, son of Lord Lovat, was, as well as others, recruiting his forces. Lochin in the same way ordered his regiment to be stationed at Culloden, and trees of Culloden wood, about three miles from Nairn.

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and reach the shrub-near Achnacarry. Here be heard from his faithful chiefains, Lochiel and Cluny, that they were at Badenoch, where he might with some risk join them. About the 29th of August, Charles met his two
friends, and was conducted by them to Letterknikie, a remote
place in the great mountain Benalder, where he remained
until a ve-sel arrived at Lochnauagh to convey him to
France. On the 19th of September he reached Bonaire,
towards which he had come; long as his pursuits, and
found a home for a short time in the house of Lady Prim-
rose, a Jacobite lady. No organised scheme for establishing
Charles Edward upon the throne of England was ever after-
wards formed.

Charles was received in France with professions of affection
from Louis XIV.; and, until his departure from France
became necessary to ensure peace with England, he was
well treated by the French king. In 1749, after the
peace of Aix-la-Chapelle, the king of France could not all
the more remain in his own kingdom. His long resisted the
missements to induce him to leave France; and notwithstanding a letter from his father, re-
commending him to comply with the wishes of Louis, he
remained at Paris. At length Charles, stepping out of a cur-
aventured, and after a severe illness, he was was
and he was afterwards conducted with a guard out of the
kingdom. After some delay he repaired to Rome. Charles
Edward married a princess of the house of Stolberg in Germany,
ruled in 1721, and was no more, and only
was happy, and the latter period of
the prince’s life was disgraced by habits of intoxica-
tion. He had no issue by his wife; but he left a natural
daughter, whom he created duchess of Albany, and to
whom he bestowed a large body of lands. After many years Charles seems to have cherished hopes of
recovering the crown of Great Britain; but at length, when his claims
were to be sustained by any foreign power, and when the
courts of Europe no longer gave him the title of Prince of
Wales, he took the Archbishop of Calcutta, and in the same degree
a habit of life strangely contrasted with his former activity.
He died on the 31st of January, 1788. Notwithstanding his failings, Charles Edward possessed much energy and
fortitude. His brother, Henry Benedict, who was created by
his father in 1708, and lord of the Manor of York, died in 1709. The
Cardinal York, was the last representative of the royal house
of Stuart. Henry Benedict died at Rome in 1807.

STUART, ARABELLA, or ARABELLA, often styled,
both by her contemporaries and by subsequent writers, the
name of only child of Charles Edward, called the
Duke of Lennox, younger brother of Henry, lord Darnley, the
father of James I. James and she therefore were full
cousins. Her mother was Elizabeth, daughter of Sir
William Cavendish, father of the first earl of Devonshire.
The birth of the Lady Arabella has been variously dated;
in 1575 (by Olydi, in MSS. referred to by Kipps, 2nd edit.
of Bing Brit.), in 1575 or 1576 (Ellis’s Letters, 2nd series,
ii. 6-14), in 1577 (article “Arabella,” in Bing Brit., written
by Morant, who however states in a note in the same page
that her father died in 1576, and left behind him this
his only child). Other accounts of the Lennox family assert
that Arabella’s mother died, before her husband, in 1574.
(Fisher’s Companion and Key to the History of England,
while, 1830, the father was out of the house, he
in the same degree
of relationship to Elizabeth that James himself did through
her mother; both were great-grandchildren of Henry
VIII.’s eldest sister Margaret; James through his mother,
Queen Mary, and her father James V. of Scotland, son of
the first of these marriages; and James through his father,
Charles Stuart, and his mother, Margaret Douglas, the
daughter of the English princess by her second husband,
Archibald Douglas, earl of Angus. She was born in Eng-
land; and during the reign of Elizabeth that circumstance
was openly stated by Parsons, the Assize (in his Conference
about the next Succession to the Crown, published under
the name of Dolman, in 1594), as giving her claim to the
throne an advantage over that of the Scottish king. At all
events she was undoubtedly, before the birth of his son,
Hector, in February, 1594, the next in order of succession
to James; and if he had died without issue, she would have
been Elizabeth’s heir, upon the same principle that he was
so accounted.

The position in which she was thus placed by her illustrious
descendants, and persons thought with them the three
theor of England and Scotland, forms the key to the history
of the Lady Arabella. While she was yet very young, it is
said that her cousin, King James, wished to have her mar-
rried to her relation, Lord Esmé Stuart, whom he looked
upon as the son of the man whom he himself had been
by whom he had created duke of Lennox; but this scheme,
which must have been projected before 1588, the year in
which Esmé, duke of Lennox, died, was defeated by the
opposition of Elizabeth. When she grew up, other matri-
mony attempts in the Stuart family made.

Mrs. Jardine’s Memoirs of Literature (pp. 357-363, edit. of 1848).
She first became an object of great preservatice, and which
manner in which her name was brought toward in 1603,
immediately after the accession of James, in the affair of
the alleged plot called the ‘Main,’ for which Sir Walter
Lytton Bruce, one of the charges against Raleigh was,
that he designed to supply the Lords of the Council under
the protection of Spain. There is no probability
however that any such design ever was entertained; it is
at any rate admitted on all hands that the Lady Arabella
would have nothing to do with it. The Duke of
Seymour’s Criminal Trials, i. 359-520; Lingard’s Hist. of Eng.,
8-18; Tyler’s Life of Raleigh, pp. 257-301.) But her situation
was sufficiently difficult and dangerous one, with
out this unfounded suspicion or imputation; the more
that she was denied the privilege of having any
substitute for existence on the bounty of the crown. James’s
wish probably was, that she should remain unmarried; but
in February, 1609, a discovery was made of a love affair
in which she was engaged with a companion of her childhood,
Mr. William Seymour (afterwards Lord Beverley), the
eldest son of the Earl of Hertford; and, although both parties
were called before the council, and there sharply reprimanded and warned to take heed of what they were about,
their affection disregarding all consequences, they
managed to go on together. It was known that a
marriage was discovered in the summer of the following year,
1610; on which Seymour was immediately committed to
the Tower, and the lady placed under custody in the house
of Sir Thomas Parry at Lambeth, from which it was some
months after ordained she should go to Durham, there to
remain under the charge of the bishop.

This marriage probably excited James’s alarm and fury the
more, inasmuch as the Seymours inherited a claim to the
throne from which both of them were descended, in virtue
of their descent from Mary, the youngest sister
of Henry VIII., upon whose representatives that king
had settled the succession, in case of failure of his own issue, by
a will which an act of parliament had certainly
repealed. [Henry VIII.] The Lady
Arabella had scarcely set out on her forced journey to
the north, in April, 1611, when she was taken ill, or presumed
to be taken ill, at Highgate; and here, in consequence, at
the house of a Mr. Conyers, she obtained leave to remain, first
for one and then for another month. When that term
was about to expire, she set out, disguised in male apparel, and,
attended by a Mr. Markham, about three o’clock in the
afternoon of Monday the 3rd of June, took horse at a little
inn about a mile and a half distant, and about six o’clock
reached Blackmoor house on the Lea, on the road. As she was curious of readiness, she was rowed down the river, and next morning
was taken on board a French vessel that waited for her and
her husband at Lee. Seymour meanwhile had also con-
tinned to effect his escape from the Tower; but as he did
not, at the last moment, make his way out of the vessel
and the vessel set sail without him, and he was obliged to make
a bargain with a coaster from Newcastle to take him across
to Flanders, which he reached in safety. His wife was not
so fortunate; a ship of war was immediately dis-
patched from the Downs to intercept her, and she was par-
tured in Calais Roads. She and Seymour never again met.
She was thrown into the Tower, where sickness and sorrow
after some time deprived the poor victim of her senses, and
shivered insane in her prison, on the 27th of September, 1613. Many of her letters that have been printed by Mr. D’Israeli, Ballard (Memoirs of

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British Edicts, and others, show that the Lady Arbella
James, by extraordinary talent and literary accomplishment to her high spirit and passionate strength of character; and she also appears to have possessed a considerable share of personal beauty. Seymour was not only permitted to return to England the year after the death of his wife, but the same year created a baronet. Having, however, at the time of his grandfather's, in 1621, and in 1640 was made marquess of Hertford, under which title he makes a considerable figure in the history of the civil war, in which he fought for the opposition, and for a long time fought against the king. Having, therefore, by his marriage with his parliamentary general the Earl of Essex by marrying his sister. He just lived to witness the Restoration, and to be restored by Charles II. to the dukedom of Somerset, which had been forfeited to him, and had been declared a land by his grandson, the Protector; he died 24th October, 1666. It is worthy of being noted, that to one of his daughters by his second wife, he gave the name of her whom he had first loved and had not forgotten.

Rogers, frequently distinguished by the name of Athenian Stuart, was born in Creed-lane, Ludgate-street, in 1713, of parents in a very humble rank of life, and by the death of his father he was left, at a very early age, the eldest of a family reduced by that event almost to indigence. He possessed an extensive knowledge of ancient architecture, relative to that intervening period before he could at all have contributed to the support of the family by his pen. In the absence of evidence to the contrary, it may safely be assumed that his education must have been a very slender one; and that, in all probableness, it was the invention and drawing, when the talent he showed for it recommended him to Goupy, who kept a shop in the Strand, and who employed him to design and paint ladies' fans—a branch of art at that time greatly in vogue, and much encouraged by the haughtiness of any person who could afford to employ any artist but the very best. It was then by drawing, that the future investigator of Athens and its monuments was trained. Fortunately Goupy himself was an artist of some ability, both as an engraver and painter in body colours, and he drew from him the very useful knowledge of instructions were no doubt advantageous to Stuart. He continued with Goupy till about 1742, when he set out for Italy, for the purpose of improving himself. Little more is known of him during his residence in Italy, than that after staying a year or more in a barren coast; and, at an early period occupied in painting, he embraced the offer made to him by his friend Revett, and Gavin Hamilton, of joining them in an excursion to Greece; though Hamilton, who was probably the originator of the scheme, afterwards declined accompanying them.

Revett (Nicholas, second son of John Revett, of Brandon Hall, Suffolk) may be supposed to have been better qualified by education for an undertaking which required some knowledge of antiquity, whereas Stuart may be thought to have been equally well qualified for the same purpose. He had long been in the College della Propaganda, as to be able to give proof of his proficiency in a Latin dissertation, De Obelisco Cesaris Augusti Campo Martia superrimem effossae, dedicated to Viscount Malton, and printed in 1750, at the pope's expense. Whether either himself or his companion had paid particular attention to architecture is doubtful, or rather, they possessed that habit they had been accustomed to, as a collateral branch of art. At all events, it is not a little remarkable that it should have been reserved for two painters to show the world what Grecian architecture was, and thereby lead to a complete revolution in architectural taste. If ever there was an enterprise calculated to raise funds for their tour, by subscriptions received from England, the travellers quitted Rome in March, 1750; and after passing some time at Venice, made an excursion to Pisa, in the following July, where they employed themselves three months in engraving the amphitheatre, a work which continued till the spring of 1753, and which they published in 1756.

In March, 1751, they reached Athens, where they remained the whole summer and winter of 1752, and with it made their excursion to the Peloponnesus, and to the island of Delos, and the works of ancient Greece, to the south of the Peloponnesus.

Stuart met with Mr. Dawsins, a lover of ancient art, the companion and patron of Wood (author of 'Ruins of Palmyra'), and who afterwards proved a most liberal patron to Stuart also on his return to England, affording him both encouragement and assistance in preparing his materials for publication. Dawkins himself however did not live to see the 'Antiquities of Athens' in a published form, for he died about two years before the work was brought out.

Stuart and his companion returned to England in the beginning of 1755, but it was not until several years afterwards (1762) that the first volume of the 'Antiquities' was published. Stuart appears to have had by far the greater share in the labour, and the literary part is ascribed entirely to him. The work was well received by the learned, and by artists, notwithstanding that, owing to the delay in bringing it out, it was only published a few years after the work of Belzoni. The greater care bestowed upon the English work gave it however a permanent architectural value, while the rival work has fallen into disrepute, and it was not until a few years later that the 'Antiquities' was somewhat concealed.

The prosecution of the work was so entirely and entirely in progress, that the time of his death. Neither was he very eager, or availed himself to the extent that he might have had the opportunities afforded him as a practising architect. His patron, the Marquis of Rockingham, Lord Anson, &c., had induced him so effectually, the latter bestowing on him a full allowance of money, and the knowledge that he was now in easy circumstances, and willingly allowed from that continued exertion which prudence no longer imposed upon him as a duty. His employment as an architect was consequently by no means so extensive as it might have been, or equal to what his celebrity would have obtained for him. His principal work is the chapel of Green-wich Hospital, as rebuilt by him, after being destroyed by fire; but although beautiful as regards the details, and the individual decorations borrowed from Greek architecture, it is not, in the present state, as a whole, one of the finest, if only because the numerous arched windows stamp it with a very different one. For Lord Anson he built a mansion in St. James's Square, and also several ornamental structures, in imitation of antique models, in the grounds of that nobleman's seat, Stowe, at Monteagle, and in his house at Montague's house, Portman-square, and some other private mansions, but none of any particular note for their architecture.

Stuart was twice married. When he had reached the mature age of sixty-seven, he took for his second wife a very young woman, by whom he had five children; among them a son, who entered the navy, and died in 1800. Another boy, who is said to have exhibited an extraordinary bent, for the love of art, was, however, very long before his father's death, which occurred on the 20th of February, 1788. The second volume of the 'Antiquities' was edited by Newton, in 1780; and the third, by Reveley, in 1794.
He died in very straitened circumstances, in 1664, at the age of eighty-two.

STUART, GILBERT, LL.D., was the son of Mr. George Stuart, who was related to the learned grammarians Ruddiman, and filled the office of professor of Humanity, or Latin, in the University of Edinburgh, with much reputation. His father resided at Edinburgh, according to the common account, in 1746; but in 1742, according to Kerr's Memoirs of Smellie, (i, 499, and ii. 2), he was educated for the profession of the law; but a passion for genius and literature drew him off from his legal studies, so that he never was called to the bar. He first made himself known by his 'Historical Disquisition concerning the Antiquity of the British Constitution,' which he published in 1767, and was the first essay on the subject; and his continued residence at Edinburgh immediately bestowed upon the youthful author the degree of LL.D.

In the following year appeared his 'View of Society in Europe, in its Progress from Rude ness to Refinement; or, Inquiries concerning the History of Laws, Government, and Manners.' This work, which reached a second edition in 1776, displayed great reading, as well as ingenuity of speculation. Soon after it first appeared, the professorship of public law in the University of Edinburgh was vacated by the death of Mr. Salvesen, and many good reasons were brought forward, in addition to his unfortunate habits of life, a temper the most envious, malignant, and revengeful, which went far to destroy all the value of his undoubted learning and talents. On his failure in the matter of the professorship, he left Edinburgh, and resided for a while at Bath, but finally did not return there, and from 1779 to 1782 was editor of the Edinburgh 'Monthly Review.' But he had found time to produce, in 1779, a satirical attack upon the newly published Latin Grammar of Dr. Adam, the rector of the High School of Edinburgh, under the title of 'Animadversions on Mr. Adam's Grammar, by J. Rich, Bushby, and he is also considered to have been the writer of other papers in ridicule both of Adam's book and of himself, which appeared about the same time in the 'Weekly Magazine,' recently begun at Edinburgh by Walter Ruddiman, the nephew of the grammarian. (And it is thought that Mr. Ruddiman, who was his nephew, had many of these speculations for which Ruddiman brought him into the school, and dropt, brought on and fed by persevering dissipation, had by the end of this space completely undermined his constitution. He returned to Scotland in the spring or summer of 1778, and died in his father's house at Musselburgh in the ensuing year (Kerr's Memoirs of Smellie; D'Israeli's Calamities of Authors; Chalmers's Life of Ruddiman.)

STUBBE, HENRY, was a remarkable example of temporary celebrity followed by nearly complete neglect and oblivion, the consequence of which, the genuine merit of his productions is not as yet understood to be; he was not a man of much knowledge not being matched with a sufficiency of judgment, and of there changing to be little or nothing in a considerable mass of literary produce which has not been superseded by later works or by the progress of discovery. He was the son of Mr. Stubbe, a gentleman of Spilby on Lincolnshire, 22d February, 1631. He spent his early boyhood in Ireland, whither his father had transferred himself and his family on being taken with a fancy for the doctrines of the Baptists; but after some time breaking out of the rebel body, he left the widow and her son back to England, upon which young Stubbe was put to Westminster school, then presided over by Busby, with whom he became a great favourite. In 1649 he was carried on account of a debt, and the young man made himself many enemies by his conceit and arrogance, he is said to have prosecuted his classical studies with such success, that while still an undergraduate he used to discourse in the public schools in very fluent Greek. He had before going up to Cambridge, been acquainted with Mr. Robert Hunter, the antiquarian, and Mr. Harry Vane, from whom he received much substantial kindness; and this connection naturally attached him to the parliamentary cause—for which however he used to declare in after-life that he never had had any real affection. But for a considerable time he exerted himself with much seeming zeal on that side in various ways. After he had taken his degree of B.A. he went to Scotland in 1653, and served for a couple of years in the army there; and then, being, on returning to Cambridge, and taking his master's degree, been made under-librarian of the Bodleian, he got himself turned out after about two years, both from that office and from his studentship, by a succession of violent pamphlets which he published against the existing condition both of church and state, 'The Stamp Act'; 'A Defence of Sir Harry Vane'; 'An Essay on the Good Old Cause'; and 'Light Shining out of Darkness, with an Apology for the Quakers.' Upon this catastrophe he betook himself to Stratford-on-Avon, and there practised as a physician till the Restoration. He went on to London where he received confirmation from the hands of his diocesan, and in 1661 was sent out to Jamaica with the title of his majesty's physician for that island; but, finding the climate not to agree with him, he soon returned and re-established himself at Stratford, from which, after some time, being transported, where he continued to reside till he met with his death, by being drowned in attempting to make his way across a river between Bath and Bristol, on the 12th of July, 1676. Stubbe, who seems to have had no principle, began to wrangle against his old political friends and his former political
opinions as soon as the hint occurred; but his only writing
was the Restoration that are now remembered. One of his attacks upon the Royal Society, the principal of which is his answer to Sprat and Glavinsen, entitled 'Legends no
History, or a Specimen of some Animadversions up
upon the History of the Royal Society; together with the Plütschulera of Mr. Glavinsen reduced by
be, here too he wasted his powers in a cause with which pos-
terity has not sympathised. Anthony Wood, who was his
contemporary at Oxford, has drawn his character graphi-
cally enough. He was, Wood says, 'the most noted Latinist
and antiquary of his time: a sufficiently prolific writer,
throughly read in all political matters, councils, ecclesi-
siastical and profane histories; had a volatile tongue, and sel-
dom hesitated either in public disputes or common dis-
course; had a voice big and magisterial, and a mind equal
to it; was of an high generous nature, scorned money and
riches, and the adorers of them; was accounted a very good
physician, and excellent in the things belonging to that pro-
fession, as botany, anatomy, and chemistry.' Stubbe, with all
his bickering memory of words and facts, was pandemic
from the faculty of distinguishing, in a case of any complexity,
right from wrong, or truth from falsehood. Wood admits
that he altogether wanted even common discretion. 'He
was,' he says, 'a very bold man, uttered anything that came
into his head, and his situation was not such as to recon-
mune him from business, but in one or two of his coffee-
houses, of which he was a great frequenter; and would
often speak freely of persons then present, for which he
used to be threatened with kicking and beating. He
had a hot and restless head, his hair being carrot-coloured,
and his eye a newt's eye. He certainly was the best
chef the reason that inerated his body almost to a skeleton.
He was also a person of no fixed principles; and whether
he believed those things which every good Christian doth,
not for me to resolve. And in fine, Wood concludes by
telling us that he became as a requital of his
understanding and knowing scholars, and others too.'

STUBBS, GEORGE, an eminent animal painter and
anatomist, was born at Liverpool in 1724, and settled in
London in 1750, especially in the pictures of horses.

Fuseli observes, 'That his skill in comparative
art never suggested to him the propriety of style in forms, if
it were not eminently proved by his Phaeton with the Horses
of the Sun, would be evident from all his other figures,
which, when human, are said to be drawn from the attendants
on some animal; while the style of the animals themselves
depended entirely on the individual before him: his tiger,
for grandeur, has never been equaled: his lions are, to those
of Rubens, what jackals are to lions; but none ever did
grow sweeter than that of this artist. Stubbs was a
realized man of art, and his animalsk were a useful
substitute for the objects of nature.' Stubbs completed in 1766 his
work 'On the Anatomy of the Horse,' in eighteen tables from nature; and before his
death three numbers of another work (which was to have
consisted of six), under the title of 'A Comparative Anatomi-
ical Tour,' which was 'A Structure of the Body with
that of a Tiger and a common Fowl,' in thirty tables.

There are two pictures by this artist in the Grosvener
Gallery, the property of the Marquis of Westminster: one of
them represents Portraits of Brood-Mares in a Land-
scape; the other, the Grosvner Hunt. The scene is near
Eton Hall, in which portraits of the late Earl Grosvenor, of
his brother, and others are introduced. These pictures
have been considered the best works of this artist.

D. Waagen, Mr. from the first of these two pictures,
says, 'I was much pleased at meeting with a picture by
this artist, of whose merits I had formed a high idea from
engravings, and from his work on the Anatomy of the Horse.
It represents horses under the shade of noble oaks:
beech, and some ash trees; and the correct representation of the horse, it is treated with great ability;
and the tone of the sky is very good.'

(Fuseli, Dictionary of Painters; Young's Grosvener
Gallery; Waagen's Arts and Artists in England.)

STUCCO, a word adopted from many other lan-
guages, and applied as a general term to plaster of any kind
used as a coating for walls, and to give them a finished sur-
face; stuccoatur, or stucco-work, is the term similarly em-
ployed for all interior ornamental work in imitation of carved
stone, so executed, such as the columns and mold-
ings of rooms, and the enrichments of ceilings. Stucco
was very much employed by the ancients, and not merely
for coating columns, &c. constructed of brick, but for which last
purpose it was applied so sparingly as to be no more than a
very thin imitations, for the purpose, it is now suppos-
ably of being painted upon. Recent inquiries into the subject of
Polychromy, by Semper and others, have put it beyond
doubt that the temple of Theseus at Athens, and other
edifices of that period, were so painted. It is not improba-
able that stucco was used, or that the ancients, in such cases,
partly to protect the stone from decomposition, for they had
the art of preparing it in the greatest perfection, and render-
ning
their stuccoes and mortars almost indestructible.

The stucco used for internal decorative purposes, such as
those already mentioned, was a mixture of lime and per-


which separates it from Pesth, and the Sarwitz. There
are many other smaller streams. The Sarwitz, which has
a very slow current, makes many stagnant pools and marshes,
which cover many thousands of acres of land: an expensive
canal has however been formed, by which part of the marshes
has been drained and rendered fit for agriculture. The
area of the county is 1800 square miles, of which 799,853
acres are stated to be useful land, viz. 360,411 acres arable
land, 332,550 acres meadow land, 168,820 acres
having taken the possession of Hiller, and 316,561 forests.
The soil is extremely fertile: it produces corn, especially wheat of remarkably fine quality; pulse, garden vegetables, and abundance of fruit. Tobacco,
wool and flax are important products, and cattle and sheep
which are made in considerable quantity, but they are not
much esteemed, because they will not keep. The breed
of horses, oxen, and swine is good; but the country is
chiefly remarkable for numerous flocks of fine sheep. The
rare species of sheep is kept for the benefit of the
for other counties. Beasts of prey, especially wolves, and
all kinds of game, are found in abundance in the forests.
Fish of various kinds are taken in the rivers and lakes.
In the Sarwitz and the marshes there are many crabs, tor-
rench, and other sea-fish. The climate of the region is
situated in 47° 12' N. lat. and 18° 23' E. long., in a
marshy spot near the Sarwitz, and is surrounded with numerous
canals for draining the marshes. It has two suburbs, which
are surrounded with a deep moat, and connected with the
town by a drawbridge. The ancient city of the antient
antient splendour; and though there are several fine build-
ings, it has on the whole a mean appearance. It
was founded in the eleventh century by King Stephen, was for
five hundred years the principal city of Hungary, was
rebuilt, and with many of them were buried, from
Stephen I., who died in 1038, to Zappoly, who died in
1340. From this circumstance it was called Alta Regia or
Regalas. It is said to be built on the site of the Roman
Flavian colony, or Pium Octavia. J. Hunter, in his Observations
on the History of Pesth, in 1729, and is said to have been well received.
But even before this he had published his first antiquarian work, 'An
Account of a Roman Temple (the celebrated Arthur's Oven)
and other Antiquities near Graham's Dike in Scotland,'
ton. London, 1720. This was followed by his Fragmenta
Curiosum, or an Account of the Antiquities and Remarkable
Curiosities in Nature or Art observed in Travels
through Great Britain,' illustrated with copper-plates, fol.,
1724. A second volume, or 'Centurias,' as it is designated,
was published in 1726, and a third volume, or 'Parochial History of
London,' which was left at his death ready for the press; and was given to
the world, along with a reprint of the former volume, in 1776.
It is of all Stukeley's works the one that is now most sought after.
His most important works were his two works on the
great druidical or rather valseum as the hereditary
architectures, the episcopal palace, the palace of
Count Schmidegg, in which are the post-office, the coffee-
house, and assembly-rooms: where the six churches, the
cathedral, and the church of St. Mary, built by Stephen I.
with the spoils taken in war. There are also a gymnasium,
a seminary, a normal school, a military academy, and a
Hungarian theatre. There are some manufactures of coarse
cloth and damask, but the inhabitants are employed
such iron works on ironmongers' agriculture.
The environs are extremely fertile.

(Hassel): Jenny, Handbuch für Reisende; Thiele, Das
Königreich Ungarn; Statistisch-Geographische Beschrei-
bung von England—first, entitled 'Stonehenge and Abury,
two Temples restored to the British Druids,' fol., 1740; the
second, 'Abury, a Temple of the British Druids,' fol., 1743.

(Avemury). A new edition of these two works was pub-
lished at London, in two vols. fol., 1838. In 1743
also appeared his 'Palographia Britannica,' 4to. He
produced nothing more except some communications to the
'Archaeologia and the Philosophical Transactions,' in 1757, and a few papers in the 'Magazine of Antiquities,'
with extracts, of the work of Richard of Cirencester, 'De
Situ Britannia,' sent to him as having been recently
discovered at Copenhagen, by J. C. Bertram [Richard of
Cirencester]; but a more extended account of this
work is given by Mr. Bertram in 'The Cargiesian Journal,
'the first entitled 'Itinerarium Curiosum,' already noticed.
In 1759 appeared, in a quarto volume, one of his most remark-
able works, entitled 'Some Account of the Metallic
History of Marcus Aurelius Valerius Carausius, Emperor of
Britain,' 'I have used his materials,' said Gibbon, in
many of his notes, referring to this work, and rejected most of
of his fanciful conjectures. No antiquarian ever had so
lively, not to say licentious a fancy as Stukeley; the idea of
the obscure remote past inflamed him like a passion; most even
of his descriptions are rather visions than sober relations of
what would be perceived by an ordinary eye; and never
before or since were such broad continuous webs of specula-

STUKELEY, THE REV. WILLIAM, M.D.,
was descended from an ancient Lincolnshire family, and
was born at Holbech in that county, on the 7th of November,
1667. From the grammar-school of his native town he
gwent to Bennet College, Cambridge, in 1702. At this time
natural science, as connected with the profession for which
he was intended, seems to have been his favourite pursuit;
and the chief assistant of his studies was Stephen Hales;
and afterwards celebrated for his physical investigations and
diary of his observations. The first part of the book was
and he, we are told, were wont to ramble over Gogmagog
Hills and the bogs of Cherry Hunt Moor, gathering simples;

Stukeley, who was a ready draughtsman, having added a
map of the country to a copy of Ray's Latin Catalogue of
the Plants growing around Cambridge, which they used
to take with them as their guide. The two friends also applied
themselves together to anatomy and chemistry, and per-
formed many curious dissections and experiments. (Ac-
to of Hales, drawn up from materials furnished by
Peter Collinson, F.R.S., in 'Annual Register for 1765.')
tion wvten out of little more than moonshine. He possessed however a great deal of real ingenuity as well as learning; and all his works contain many things that are both curious and valuable, some of them much that would by this time have been irrecoverably lost but for his record of it, although few if any of either his theories or his histories are to be received throughout with implicit faith. His only theological work, we believe, was a collection of Sermons, published in 1760, under the title "An Expository Discourse on the Psalms," which is occupied with the natural history and botany of the antient world. As a man, Stukeley appears to have been distinguished by a very placid and amiable disposition.

(Hutcheson's Medical Biography; Notice, by Collinson, in Aboriginal Register for 1765.)

STURGEON. [Sturionidae.] STURIONIDAE, a family of fishes belonging to the section Chondrostei, the species of which are distinguished from others of the section by the gills being free, as in ordinary fishes, thus differing from the second great division of the fishes having a cartilaginous skeleton, such as the Sharks and Rays, in which the gills are fixed, and have their outer margin attached to the skin. The Sturionidae are, it is believed, the only one of the sturgeons, with the exception of the species Sturio, which were known to have issued from their press an edition of Homer, and one of Xenophon's "Memorabilia Socratis," which appeared in 1529, 4to.

In the northern part of Europe," observes Mr. Yarrell, "this fish is much more numerous than with us, and extensive fisheries are established for its destruction. Caviar is made of the roe of the female; unguella is obtained from the deuce matured fish, forming the air-bladder; and the flesh, besides being preserved by salting and pickling, is in request for the table while fresh, being generally stewed with rich gravy, and the flavour considered to be like that of veal. The flesh, like that of most of the cartilaginous fishes, is more firm than that of the flesh of the osseous families.'

Two species of sturgeon have long been distinguished by the fishermen of the Solway Firth, the one with a blunt nose, and the other with a sharp nose, the latter of the same species, but is not so much esteemed. The former is distinguished by Dr. Parnell, in the 'Transactions' of the Royal Society of Edinburgh (vol. xiv. pl. 4), and is introduced by Mr. Yarrell, in the Supplement to his 'History of British Fishes.' Several species of sturgeon are known among the rivers of Russia and Persia, and will be found described and figured by M. A. Lortzsky, in the third volume of the 'Transactions' of the Imperial Society of Naturalists at Moscow. Three species are found in the rivers which flow into the Black Sea, and moreover North America possesses species which are peculiar.

The genus Spatularia is distinguished by the enormous prolongation of the muzzle, the sides of which are dilated. The general form of the body nearly resembles that of the Sturgeon, but is not so sharply defined. The largest of these species is that of the Rhine, described by Mr. Yarrell, in the 'Transactions of the Royal Society of Edinburgh.' It is of a considerable size, and the flesh is said to be very agreeable.

The genus Chimaera, Linn.—Although placed in the present section, the Chimaera differ considerably from the sturgeons, and are in fact very nearly allied to the sharks. Though in this respect, which is not unfrequently met with in the mouths of Dr. Richardson, in his "Fauna Boracae-Americana," the fins in reality adjoin by a large part of their borders, and are consequently five holes communicating with the external gill-opening. They have a rudimentary operculum and the external gills are less reduced than in the sturgeons, are furnished with hard plates, two below, in place of teeth. The males are distinguished by trifid bony appendages to the ventral fins. The eggs are large and of a coriaceous texture, and have flattened and hairy margins. The snout, supported like that of the sharks, projects forwards, and is pierced with pores arranged in tolerably regular lines; the inferior dorsal fin is armed with a strong bony spine; and is placed over the pectorals.

In the genus Chimaera, as at present restricted, the snout is conical and well developed; the body is large and the fins, with pores arranged in tolerably regular lines, the inferior dorsal fin is armed with a strong bony spine; and is placed over the pectorals.

The next genus differs from Chimaera chiefly in having the snout terminated by a large fleshly appendage. The second dorsal fin is placed over the ventrai, and terminates opposite the commencement of the lower tail fin. The only species known is Chimaera (Chimaera Callorhyncha of Linnaneus), an inhabitant of the South Seas. A second species of Cattaphys is described by Mr. Bennett under the name Cattaphys Smythi, in the zoological appendix to Beechy's 'Voyage.'

The species of sturgeons is a well known and celebrated, the generality of which have been described in his publications. To the knowledge of the present genus (C. Taturmus), * which he regards as distinct. It is from Port Arthur, Van Diemen's Land.

STURM, JOHIN, was born on the 1st of October, 1567, at Wolzien, near Yarmouth, in the German Duchy of Schleswig, and died in Paris, the 16th of April, 1594 he went to Louvain, where he devoted himself to antient literature, but after a few years' study he entered into partnership with Rutger Resius, an eminent Greek scholar, who was forming a printing establishment at Louvain for the printing of Greek authors. To the knowledge of the present genus (C. Taturmus), * which he regards as distinct. It is from Port Arthur, Van Diemen's Land.

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learned men of the age. He went so far in his liberal support of persecuted Protestants, that he became involved in some great pecuniary difficulties; but he was far from being a vehement sectarian. He appreciated the merits of every man, whatever might be his religious opinions, and he was no less esteemed by Roman Catholic prelates, than by the moderate party among the Protestants. As a teacher he was eminently successful. On account of his great knowledge of rhetoric, and his elegant Latin style, he was called the German Cicero. His works, all of which are written in Latin, are very numerous. The following are the most important:—An elegant prose paraphrase of the Meditations, 1684; "Physica," 1684; "Hypothese," 1684; "Philosophia Tertia," 1688; and several other works, dealing with Groningen and species of sciences, in a very elaborate and systematic commentary on the rhetorical Hermogenes. — "Anti-Pappus Quaestor," Neustadt, 1684; 4to. (this work contains his theological controversies with Pappus, Osiander, and others.) His treatises on education have been reprinted in several collections of works on this subject.


STURM, JOHN CHRISTOPHER, a German mathe- matician, was born at Niirnberg, in the Electorate of Bavaria, November 3, 1635. His father, who was master of the wardrobe to the elector of Bavaria, having been ruined by the wars, the youth was indented for the benefs of a good education to the benevolence of Daniel Wul- fer, a citizen of Niirnberg, who engaged Sturm to a school in that city, where, during eight years, he was engaged in the study of the antient languages and such of the sciences as were taught. Having made considerable progress, young Sturm was sent by his benefactor to the university of Jena, where he collected several works of Descartes and others, and was admitted to study at Leyden. He remained there only one year, and then he returned to Jena, where he qualified himself for the church. He was appointed to the ministry for one of that class of pastors in the Protestant Church, of whom he continued to perform the duty till 1667, when, through the interest of his friends, he was appointed professor of mathematics in the university of Altdorf, in Franconia. This post he held during thirty-four years, and it is said that he was the first who was possessed of the knowledge of the history of Germany, the practice of giving instructions in the elements of useful science to the children of the working classes.

Sturm had been educated in the philosophy of Aristotle; but on his visit to Holland he became acquainted with that of Descartes; and, after a vain effort to reconcile the principles of the antient with those of the modern physics, he formed for himself a species of philosophy by selecting whatever, in either, appeared most consonant to nature and reason. At this time he endeavoured to introduce into the schools of his country; and though he did not wholly succeed, he contributed much to the general diffusion of a knowledge of the physical sciences in the north of Europe. On November 23, 1703, leaving a son, Leonard Christopher Sturm, who became an architect, involved in both parties, together with the letters to Dr. More, were published in 1791 and 1715; these contain many curious experiments.

STURM, CHRISTOPH CHRISTIAN, was born on the 25th of January, 1750, at Augsburg. He studied theology at Jena and Halle, and was subsequently appointed a preacher at Magdeburg. In 1778 he obtained the office of pastor at the church of St. Peter, and of Schollachurs, at Hamburg. His sincere piety, his zeal as a religious instructor of the people, and his learning gained for him the love and esteem of his flock. His leading principle was that a preacher ought to combine the spirit of religion and morality fruitful in his own actions before attempting to effect the same in others by his instruction; and his whole life, which is marked by scarcely any incidents, was only characterised by the honest endeavour to carry his principles into practice. He died on the 26th of August, 1786.

Sturm wrote many religious works, which are more of a practical than of a scientific character. The following are the in sat article by itself; and the power he had been chosen because Sturm's theorem is at once the most conclusive and the latest of the three. It has long been a problem of much interest and notoriety to find, in a given equation, how many roots, if any, are contained between two given limits; how many of these roots are positive, how many negative, how many imaginary.

The first step towards the solution of the preceding problem was made by Descartes, though it is asserted by Cosin and Libri, that Cardan came very near to the same step. The former, in fact, has a table of 128 equations, putting them in a form which Cardan did not use (an equation with 0 on the second side), then says that an analyst who should look at this table would be able to resolve the invention, but contrary. All the world knows that mathematical discoveries are recognised often enough by analysts of a later day, in rudiments from which the fabricators of them could evolve nothing.

The theorem of Descartes, expressed in his own words, is as follows (Geometria, lib. iii.) — Ex quibus etiam cognoscitur, quo verbo et quod falsa radices in unaque aequatione haberi possint. Nimimum, tota ex veris aequationibus, quae per rationem esse possint, inveniuntur. Quo quidem etiam aequationes recte — et tot falsas quod vicious ibidem comprehensor in signa +, vel duo signa —, quo se inventam sequuntur. That is, that an equation may have as many positive roots as there are changes of sign in passing from term to term, and as many negative roots, so many times the sign; but not more of either kind. It has been doubted whether Descartes knew the true meaning of his own theorem as to the case of imaginary roots; this doubt is as early as the time of Descartes himself, who replies in a letter which we cannot find by means of Réaumur's reference to it. This is however of little consequence, as the following sentence (also in the Geometria) shows in what manner Descartes understood his own words: — Ceterum radices tam vero quam falsa non semper sunt reales, sed aliquando...
tangent imaginariae; hoc est, semper quidem in qualibet 

\textit{Equatione} tot radices quot dixi, imaginarii licet; verum nulla interdum est quantitas quae illis, quae imaginarius, responsa.

It would seem then that Descartes not only remembered the limitation of the theorem arising from the possible existence of imaginary roots, but proposed to divide 
those last roots themselves into two classes corresponding to the true and false (or positive and negative) of the real roots. The theorem was made by him (1641) who showed that the roots of an algebraical equation \(x = 0\) are never all real, unless the roots of the derived equations \(x^r = 0\) are all real; \(x, x^2, x^3, \&c.\) being the derived functions, or differential coefficients, of \(f(x).\) He also showed how to determine the existent conditions of the reality of all the roots. (\textit{Lagrange, Res. des Equ. Numer.} note viii.; \textit{Peacock, Report, \&c.} p. 327.)

Descartes's theorem would be perfect if the roots of equations 
were always real. For example, take \(x^2 - 5x + 6 = 0\). If the roots be real, they are \(2\) and \(3,\) but the roots derived from it, namely, that the derived functions must be consulted upon the question whether the roots of an equation be real or not; and the common theory of equal roots, namely, that when \(x^2 = 0\) has \(m\) equal roots, \(-1\) of its derived functions (which are for more or less vanish at the same time, or with the same root, -- were the hints on which Fourier was able to make an advance upon his predecessors. The coefficients of the equation are nowhere anything but the \textit{divided} derived functions, on the supposition that \(x \neq 0\). Thus, if \(x^4 = 7x^3 + 14x^2 + 4,\) we have

\[\phi_0 = 4, \quad \phi_1 = 2, \quad \phi_2 = 0, \quad \phi_3 = 0.\]

Let \(\phi, \phi_1, \phi_2, \&c.\) be the function in question and its derived functions. If we make \(x\) great enough and positive (say infinite and positive), the signs of these functions are all alternate, that is, the series yields nothing but changes of sign in passing from term to term. But if we make \(x\) great enough and positive (say infinite and positive), the series yields nothing but permanences of sign. Thus, in the preceding expression we have

\[x = \infty \quad \text{x} \neq 0 = \text{x} + \infty\]

\[
\phi_x \quad \phi_2 \quad \phi_3 \quad \phi_4 \quad \text{nothing two no}
\]

\[\phi_x = 3x^2 - 7x + 14 + 4, \quad \phi_2 = 2x^2 + 14x + 11, \quad \phi_3 = 7x^2 - 7, \quad \phi_4 = 3x.\]

Now Descartes's theorem tells us that there may be one negative and two positive roots, and we see that in passing from \(x = \infty \) to \(x = a\), through the whole range of negative quantity, there is one change of signs lost; while in passing from \(x = 0\) to \(x = +\infty\), or through the whole range of positive quantity, two changes of signs are lost. Fourier's theorem would suggest itself as highly probable to any one who put Descartes's theorem in this form: the following:

\[\begin{align*}
\text{when } x = a, & \text{ the signs of } \phi, \phi_2, \&c. \text{ are ascerained, and let this be called the criterion series, or simply the criterion. Then in passing from } x = a, \text{ the less, to } x = b, \text{ the greater (greater and less being understood in the derived functions, the criterion of sign, though it may lose them. When } m \text{ changes of sign are lost to the criterion in passing from } x = a, \text{ the less, to } x = b, \text{ the greater, it follows that there are either } m \text{ real roots of the equation lying between } a \text{ and } b, \text{ or some number }
\end{align*}
\]

\[\phi_x \quad \phi_2 \quad \phi_3 \quad \phi_4 \quad \text{nothing two no}
\]

\[\phi_x = 3x^2 - 7x + 14 + 4, \quad \phi_2 = 2x^2 + 14x + 11, \quad \phi_3 = 7x^2 - 7, \quad \phi_4 = 3x.\]

All the signs except those in the lowest line are dictated by the preliminary theorem. Thus \(\phi_x\) in the first place, is considered by hypothesis, now \(\phi_x = 0\) if \(x = a,\) and we take \(b\) so small that there shall be no root of \(\phi_x\) between \(a \text{ and } b.\) Then \(\phi_2\) must be negative before \(\phi_x\) vanishes, and positive afterwards. Hence \(\phi_2\) continuing negative, \(\phi_2\) must change from positive to negative. Again, \(\phi_2 \phi_3\) makes a similar change. The least consideration will show that, in the signs in the lowest line, the being given, those in all the upper ones must be as written.

3. When intermediate functions vanish, changes of sign are never gained, but only lost; and are never lost but in even numbers. Suppose, for instance, that \(\phi_2\) vanishes, but not \(\phi_4.\) We have then one of the four following:

\[\phi_2 \quad \phi_3 \quad \phi_4 \quad \text{nothing two no}
\]

\[\phi_x \quad \phi_2 \quad \phi_3 \quad \phi_4 \quad \text{nothing two no}
\]
When \( x = 0 \), the criterion shows four changes; at \( x = 1 \), it is indefinite, owing to \( \phi_1 = 0 \). But immediately before \( x = 1, \phi_0 \) must, by the preliminary theorem, have the sign contrary to that of \( \phi_1 \), or the sign \(+\); consequently, for \( x = 1 - \epsilon \), however small \( \epsilon \) may be, the criterion must be \( + + + + \). Then, between \( x = 1 - \epsilon \) and \( x = 1 \), the criterion is \( + + + + + \), so that there is one root between \( 0 \) and \( 1 \), or two imaginary roots. To try this further, let \( x = 2 \), the criterion of which is \( + + + \), so that there is no root between \( 0 \) and \( 1 \). Lastly, there is one root between \( 2 \), and one between \( 3 \) and \( 4 \). The theorem of Fourier, though very convenient in practice, is defective in theory, as requiring an unlimited number of trials. If two roots were very nearly equal, it would require very minute subdivision of the interval in which they are first found to lie, to distinguish them from a pair of imaginary roots. This theorem was not published till 1831, in Fourier’s posthumous work, but his author had made his methods known, and among others there is Sturm, a young Genevoise, employed in the bureau of M. de l’Euree, editor of the bulletin which bore his name, now a member of the Institute, and enjoying a reputation which may excuse this mention of the circumstances of his private life. Sturm applied himself to the place in the plane of \( \phi_0, \phi_1, \phi_2, \phi_3 \), in such manner that the criterion formed from them, in the same way as in Fourier’s theorem, should never lose a sign of change of roots; if the roots of the following: 

\[
\phi_0 + \phi_1 x + \phi_2 x^2 + \phi_3 x^3 + \phi_4 x^4
\]

are \( 0 \) and \( 1 \), or \( 2 \), or \( 3 \), or \( 4 \), or among any imaginary numbers, then \( \phi_0, \phi_1, \phi_2, \phi_3 \), \( \phi_4 \) have one of the signs \( + + + + \) or \( + + + + + \), and so on, and that \( \phi_0, \phi_1, \phi_2, \phi_3 \), \( \phi_4 \) have only one root of the value, that \( \phi_0, \phi_1, \phi_2, \phi_3 \), \( \phi_4 \) change sign in passing from \( x = a \) to \( x = a + h \). Since \( \phi_0 \) does not vanish with \( \phi_1 \), we have one of the four cases following:

\[
\phi_0 x^4 + \phi_1 x^3 + \phi_2 x^2 + \phi_3 x + \phi_4 = 0
\]

For example, let \( \phi_0 = 2x^2 - 7x^3 + 15x^4 - 10x^5 + 2 \), \( \phi_0 = 4x^2 + 21x^3 + 10x^4 - 4 \), \( \phi_0 = 8x^2 + 31x^3 + 15x^4 - 7 \), \( \phi_0 = 1 \).

There are no negative roots, as is obvious from their being nothing but changes among the coefficients; if we consider the criteria for \( x = 0, 1, 2, 3, \) and \( 4 \), we find the following results:

\[
\begin{array}{ccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 \\
\phi_0 + & + & + & + & - & - & - \\
\phi_0 x + & + & + & + & + & + & + \\
\phi_0 x^2 + & + & + & + & - & - & - \\
\phi_0 x^3 + & + & + & + & + & + & + \\
\phi_0 x^4 + & + & + & + & + & + & + \\
\phi_0 x^5 + & + & + & + & + & + & + \\
\end{array}
\]

* Observe that in these cases a change is removed to a higher place in the table, near to the head of the criterion.
change and a permanence, in a different order perhaps, when \(x = a + h\). Consequently, if in passing from \(x = a\), the lower to \(x = a + h\), it appears that the number of changes in sign is lost, it is certain that there must have been no real roots of \(V = 0\) between \(x = a\) and \(x = h\).

Now, \(Vp\), being the derived function of \(V\), it remains to find \(Vp, Vp, \&c\). Divide \(V\) by \(Vp\), which is of one dimension lower, and there are \(p\) and a remainder \(R\), then \(V = \frac{V}{Vp} + R\). Again, divide \(Vp\) by \(Vp\), giving a quotient \(p\) and a remainder \(R\); we have then \(V = \frac{V}{Vp} + p + R\), and so on. It appears, then, that \(V\) being the derived function of \(V\), must proceed according to the greatest common measure of \(V\) and \(Vp\), only changing the sign of every remainder as fast as it is obtained. In order that the last, \(V\), may be a finite constant, it is requisite that there should be no equal roots. We must then suppose the equal roots to be separated beforehand, as in the usual method. In fact, this very process of finding the greatest common measure, with or without change of sign in the remainders, will first detect the equal roots, if any. It is important to remark, that at any step in the solution of equations, that by any multiplication, the signs (the only things we have to do with) not being in any case altered by such multiplication.

In Involution and Evolution a method of performing the operations required in Sturm's theorem was proposed, which is as follows. Mr. Young, inINFATUATING, p. 143) has since proposed another, of much the same degree of abbreviation. Sturm's theorem however requires so much operation, that there can be little doubt of that of Fourier being a more easy mode of working any particular case. It is only necessary, as the process proceeds, to change the signs of each of the equations, then the last equation, which is the result of the previous ones, will give the number of roots the equation has.

Since all that is necessary to the theorem is that the last function \(V\) should retain one sign, and not vanish, we may stop in the process when we arrive at any function of which all the roots are known, or can be discovered, to be impossible. And it is easily shown that when there are equal roots, so that the last, \(V\), is neither constant, nor always of the same sign, the theorem still remains true, so far as to give the number of different roots which lie between any two given limits without any information as to the number of times which each root should be repeated. For instance, in the article cited we find

\[
\begin{align*}
V &= x^3 - 2x^2 + 2x - 3 \\
V &= x^2 - 3x + 1
\end{align*}
\]

We need not go further, for \(V\) has none but imaginary roots. Now, when \(x = 0\), the criterion is \(+ \); when \(x = \infty\), it is \(-\); and when \(x = -\infty\), \(+\). Consequently there is one negative root, one positive root, and a pair of imaginary roots.

The following example is from Mr. Young (p. 191): it is an instance given by Fourier in illustration of his own method, and Sturm's is applied to it by Mr. Young, to show the superior certainty of the latter. Of that certainty no one can doubt, but the process exhibited in the page cited is such as will never come into general use unless the work can be made more easy:

\[
\begin{align*}
V &= x^2 - 2x^2 + 3x - 2 \\
V &= x^2 - 2x^2 + 3x - 2
\end{align*}
\]

\[
V = x^2 - 2x^2 + 3x - 2
\]

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\]

\[
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\]

There where the form for \(x = -\infty\), \(0\), \(\infty\), and \(+\) mean that there are three real roots.

Here the results for \(x = -\infty\), \(0\), \(\infty\) mean that there are three real roots.

The there are no negative root and two positive roots, and therefore four imaginary ones. The reader will readily find that the positive roots lie between 1 and 2, and the negative roots between -1 and -2. The values of the constant, leaving out the actual performance of multiplications, has 400 figures in Mr. Young's work. Fourier has merely written down the derived functions, which is done at sight and the form for \(x = -\infty\), \(0\), \(\infty\), and \(+\) mean that there are three real roots.

In this the second is shorter, more compressed, and very much resembles that of a thrush, being almost destitute of the glottal angle, and the manner of its dark-colored plumage. The third or aberrant division includes the boat-tails (Scaphodiurinae), the hang-noses (Icterinae), and the moor-birds (Aegialinae), all of which
are characterised by a perfectly entire flank-like bill, more
or less conic, but of different lengths.*

In the Scaphidurita, with which Mr. Swainson
commences, we have, he remarks, the largest birds in the whole
family; those in short which even a scientific observer may
consider as natural birds, and is capable of distinguishing them from the singular structure of their graduated tail,
which becomes so concave on its upper surface by the
oblique folding on its sides, as to resemble a boat in form.
Mr. Swainson, after stating that all the true species of this
genus are confined to America, and states that they are
notched, expresses his opinion that they are the rassional
division of the family. But, he adds, there is a bird from New Guinea, Astrapia gularis,
Vieill. (Corvors, vol. viii., p. 72), which, from exhibiting the boat-like form with the extraordinary growths of
feathers under the tail, and the structure of the bill, is
of the type, if its bill and general habit did not evince an
approximation to the Lamprotornitse. Astrapia, he re-
marks, has been associated by all writers, except Mr. Tem-
man, with the Paradise-birds, from the uncommon parallelism of its structure.

The next subfamily, or Lamprotornitse, comprise, ac-
cording to Mr. Swainson, many smaller groups whose char-
acters have not yet been sufficiently investigated; whilst others, such as the Rasorial, have, by the carefully
laid down characters of the genus, been placed with the crows.
He does not seem altogether satisfied with the position which he has assigned to Astrapia,
for he remarks that this magnificent bird, but for its long
boat-shaped tail, would certainly be ranked with this group,
of which the same author, and he believes, is the
merstellar genus. He then sums up the chief peculiarities
of the grackles, viz. the strong throat-like bill, generally
notched, but never angled at the base, and the remark-
ably large and stout feet, and the general blackness of their
plumage. The best interests of their natural history and
structure of the bill, the swallow and the swallow-tails,
are included in this group, one species, which, by its
peculiarities, adds to the diversity of the large family.

Mr. Swainson finds the passage to the Sturninae, or true
Starlings, easy and natural, as he traces in the main
many of the characters of the grackles, united with those of
the Pastor starlings. In the Sturnina the bill is much
more straight, and the under mandible considerably thick-
ened at the base, where the commissure forms an abrupt
angle, not so strong as in the rasorial, but as robust as in
these birds, indicating their walking propensities exerted
in following the tracks of cattle in order to search after such
insects as are disturbed by their grazing. He adverts to the
association of crows and starlings in the same field, nearly
in the same manner, and indicates that each bird representing
the other in its own particular family; in both, he remarks, the lengthened and conic
form of the bill is well adapted for searching after insects in the
ground; both walk in the same stately manner, and
both seem so attached to cattle and sheep as to rest upon
their backs. The common starling may sometimes walk
steadily, but when we have observed it hunting assiduously
for its insect food, the gait is more like a hurried run than
a stately walk. But to return to Mr. Swainson; he re-
marks, in regard to the Starlings, that in the European Starlings (Sturnus) that organ is more acute
and depressed; the notch also, he adds, is so faint as to be
nearly obsolete. In concluding his observations on this
subfamily, he adverts to some of the foreign Pasteors lead-
ing which, after all, he thinks belong to the family. The
European Starlings (Sturnus) which organ is more acute
and depressed; the notch also, he adds, is so faint as to be
nearly obsolete. In concluding his observations on this
subfamily, he adverts to some of the foreign Pastors lead-
ing which, after all, he thinks belong to the family. The
European Starlings (Sturnus) which organ is more acute

* [Note: This text seems to be fragmentary and incomplete, possibly due to a page turn or a break in the text. The context suggests it is discussing bird species, possibly within the family Sturnidae, and is part of a larger discourse on ornithology.]
the second nearly equal to the third. Tail short, broad, rounded. Feet very large and strong. Middle toe as long as the tarsus; hinder shorter; lateral toes equal. Claws somewhat slender, acute, but not much curved.

Locality.—Warm latitudes of the Old World. The dendrophial type. (Sw.)


*Garrulus*, vol. xx. p. 68.]

_Acridotheres_, Vieill.—General structure of *Pastor*; but the whole of the head entirely naked, and furnished with bushy eris and wattles. Nostrils large, naked. Feet moderate. Tail even. Bill very wide at the base. The tarsal mm. are rather short, and placed convexly. Very large, longer than the head; the sides are compressed. Culmen flattened, nearly straight, and angulated on each side; the base advancing very far upon the head, and dividing the frontal feathers. Nostrils large, in a large depression of the base of the bill. Wings very short and considerably rounded. Tail moderate, rounded; all the feathers, and the secondary quills, ending in pointed points. Legs long and robust. Tarsus much longer than the middle toe; lateral toes unequal, the inner shortest. The sexual dimorphism.

Example, *Acridotheres carunculatus*.

_Oxystomus_, Sw.—Bill much lengthened, longer than the head; the sides are compressed. Culmen flattened, nearly straight, and angulated on each side; the base advancing very far upon the head, and dividing the frontal feathers. Nostrils large, in a large depression of the base of the bill. Wings very short and considerably rounded. Tail moderate, rounded; all the feathers, and the secondary quills, ending in pointed points. Legs long and robust. Tarsus much longer than the middle toe; lateral toes unequal, the inner shortest. The sexual dimorphism.

Example, *Oxystomus carunculatus*.


*Subfamily Character.*—Bill thrust-like, compressed; the culmen curved from the base. Lateral toes unequal. 

Genera.

_Pilornorhynchus_.—Size large. Bill short, very thick, convex above: both mandibles distinctly notched. Nostrils placed half-way between the gap and the tip, partly concealed by the short thick-set feathers of the front of the bill, which lie on the bill half of the bill. Wings rather short, rounded; the first and second quills graduated; the third shorter than the fourth and fifth, which are the longest. Tail moderate; the feathers broad, their tips truncated. Feet ambulatory, large, and very strong. Middle toe and tarsus of equal length, hinder toe very strong, but much shorter; lateral toes unequal, the outer longest, and united to the middle as far as the first joint. Australia. (Sw.)

Example, *Pilornorhynchus holoicercus*.

_Lamprotornis_, Tomm. Grable.—Bill thrust-like, compressed its whole length. Culmen curved from the base to the tip. Upper mandible notched. Commissure slightly curved. Nostrils midway between the tip and the gap, naked, but with the frontal feathers reaching to their base. Wings long, ample; the first quill spurious; the third, fourth, and fifth of equal length, and longest. Tail short, even, rounded, or (as in the sexual type) considerably lengthened and emasculated. Feet very large and strong. Middle toe and tarsus equal; hinder toe strong, but much smaller.


*Subfamily Character.*—Bill of a very lengthened conic shape; the culmen sligntly curved. Tail graduated, the sides reflected upwards, or boat-shaped. Feet strong. (Sw.)

Genera.

_Astrapia_ (ante, p. 173).

_Scoophilura_, Sw.—Bill longer than the head, conic. Both mandibles equally thick. The base of the culmen broad, flattened, and advancing very far on the front of the head. Commissure angulated at the base, and situated on the sides. Nostrils basal, placed a small, angular, follow on the sides; the membrane obsolete. Wings lengthened, pointed; the first quill longer. Tail moderate, graduated, boat-shaped. Feet strong. Middle toe and tarsus of equal length; hinder toe much shorter; inner toe hardly shorter than the outer. South America. (Sw.)

Example, *Scophirocerus harisi*.

_Quiscalus_, Vieill.—Bill longer than the head, compressed. Both mandibles equally thick. Culmen slightly curved, and cutaneous on the base, where it simply divides the frontal feathers, without being dilated. Commissure considerably sinuated. Nostrils broad, naked; the aperture round. Wings moderate, somewhat pointed; the two first quills slightly shorter than the third and fourth, which are the longest. Tail rather lengthened, much rounded, boat-shaped; tips of the lateral feathers truncated. Feet large; strong; Middle toe and tarsus equal; hinder toe shorter; inner toe scarcely shorter than the outer. America. (Sw.) Example, *Quiscalus vesireicolor*.

_Scopecophasus_, Sw.—Bill shorter than the head, straight, slender; the margin inflexed, but not sinuated. Wings moderate, pointed; the first quill rather shorter than the second. Tail divaricated, flat, and slightly rounded. Legs lengthened, slender, formed for walking. Middle toe and tarsus of equal length; hinder toe much shorter; lateral toes of equal length. Claws slender, acute, slightly curved. (Sw.)

Example, *Scopecophasus ferrugineus*.

Subfam. *Ictericinae*. Hone-needles.

*Subfamily Character.*—Bill completely conic, entire, rather longer than the head; a long point on the beak. First and other mandibles slightly bent. Feet formed for grasping. The claws thick, broad, and much curved. (Sw.)

Genera.

_Cassinus_, Daudin. *Cassiniana*.—Bill rather longer than the head; the base thick, very convex, and enlarged into a broad oval plate, which advances very far on the front, and divides the frontal feathers. Nostril oval, naked; the bill is pierced in the solid substance of the bill, and close to the margin of the upper mandible. Commissure straight, but angulated at the base. Wings rather long; the first and second quills graduated. Tail graduated. Feet short, very strong. Hind toe and claw nearly as long as the tarsus. Tropical America. (Sw.)

_Zanthornus_, Xanthornus. —Bill not longer than the head, generally shorter, perfectly straight; the culmen not dilated at the base, but simply dividing the frontal feathers. Nostrils large, pointed; the first three or four quills generally or nearly equal. Tail moderate, rounded. Feet moderate, but with the hinder toe manifestly longer than the tarsus; lateral toes unequal. America. (Sw.)

Example, *Zanthornus baltimori*.

_Icterus_, Castro.—Bill somewhat lengthened, as long as the head, or longer; both mandibles slightly curved, and considerably attenuated. Nostrils basal, rather large, covered above by a membrane; the aperture lateral and oval. Wings moderate; the first and second quills rather shorter than the third. Tail somewhat lengthened, graduated. Feet moderate. Inner toe shorter than the outer; hinder toe shorter than the tarsus. Example, *Icterus castaneus*.

_Chrysomus_, Sw.—Bill resembling *Zanthornus* (Xanthornus must be meant); but the margin of both mandibles is curved, not pointed; the first three or four quills longer than the second. Tail rounded. Feet formed for walking. Toes long, very long and slender; middle toe longer than the tarsus; lateral toes equal; hinder toe shorter than the tarsus. Claws long, very slender, and but slightly curved. (Sw.)

Example, *Chrysomus temminckii*.


*Subfamily Character.*—Bill short, thick, entire, completely conic, sometimes depressed, and rounded at the tip. Culmen rather broad, and flattened at the base. Legs long, slender, formed for walking.

Genera.

_Dolichonyx_, Sw.—Bill very short, fish-like, conic, entire, shorter than the head; the commissure sinuated. Wings pointed; the first and second quills longer and nearly equal. Tail slightly graduated, subacuminate; the tips acuminate, and somewhat rigid. Legs long, slender. Middle toe longer than the tarsus; lateral toes unequal, the
inner longest; hind toe of equal length with the tarsus. Claws long, very slender, and slightly curved. (Sw.)

Example, Dolichonyx oryzivorus. 

Psarocolius, Sturnus, Philodectes, Sea-

762, Psarolophus, Reminis-

Sturnus, the Icterinc B. Emberizoides, Xanthornus, is culmen Chlamydera, continued first 

phidura, dutinus, Swains. cuius, Spreo, der.

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The Mr. Corvixnce. 

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We have here given the views of some of the principal ornithologists relative to the family of starlings; and we think it no one can look at these, who are in any uncertain state in which this department of natural history, in common with too many others, is, and the absolute necessity that exists for a reform of the nomenclature. How that reform is to be brought about is a problem of no small difficulty. A proposed scheme is a uniform and permanent, which it is the intention of the proposers to submit at a future period to the consideration of the British Association for the Advancement of Science, has been sent to us, and, after a careful perusal of the several proposals, we have selected that one which seems most likely to be adopted. The proposers are anxious to make the zoologists of all other civilized parts of the world to go hand in hand in the propagation of this study, and, to a full, satisfactory, and permanent conclusion, we will earn the merited praise of every one who is interested in the science. Previous to their submission of their plan to the British Association, the proposers are anxious to continue the science, and are now occupied in preparing the necessary zoologists in various countries; and they state that they will feel grateful for any remarks or criticisms with which they may be favourably, addressed to the care of Mr. Richard Bowler, Red Lion Inn, Fleet Street, London. Several eminent zoologists have already formed a committee, and we have reason to believe that it is their intention to submit their plan to the next meeting of the Association at Manchester. They desire the cooperation of all zoologists, and the encouragement of all men of science.

STURZ, HELFRICH PETER, born February 16th, 1749, at Darmstadt, was, although in a subordinate class of literature, a first-rate writer, and almost the first who distinguished himself by a genuine and extensive acquaintance with German, and by his playful humour. After filling the post of private secretary, first to Baron von Widmann at Munich, and next to the chancellor Von Eyben at Glückstadt, he went, in 1762, to Copenhagen, where he resided some time with a similar character but more in the capacity of a lector, and afterwards was appointed for him appointments of very considerable value. In 1768 he was made Danish "Legationsrath," and visited France and England in the suite of Christian VII. From this journey originated his "Briefe eines Reisenden," which contain many interesting notes, and various anecdotes relative to the eminent literary characters and others to whom he had been introduced. At this period, while enjoying the present, he could look forward to still brighter prospects for the future; but the scene suddenly changed. Implicated in Streisand’s fall, he was arrested in January, 1772, just as he was on the eve of being married, and although released within about four months, so great was the shock he experienced, that he never completely recovered from it, for it continued much less to affect both his mind and his body during the rest of his life. His circumstances too were greatly changed by that event; and although he obtained an appointment which afforded him a sufficiency, it was in a small town in the duchy of Oldenburg, where he was completely removed from all the intellectual circles which he had enjoyed in the capital. He lived for some years a sort of banishment several years, when letters reached him from Copenhagen announcing the most flattering prospects, but such was the effect the unexpected intelligence had on him, that he survived it only a few days, being suddenly carried off by fever, December 11th, 1775.

Besides the work above mentioned, and his "Reminiscences of Bornstorf," he wrote a number of literary papers on miscellaneous subjects, which he had begun to collect and publish, but his death prevented him from doing so. STUTTGARD, the capital of the kingdom of Württem-
berg, and the residence of the king, is situated almost in the centre of the kingdom, in 45° 45' N. lat. and 9° 12' E. long. It lies at the bottom of a valley, surrounded on three sides by mountains and hills, which are covered with vineyards and gardens. The valley is extremely fertile, and forms what the Germans call an English garden, extending to Kannstadt. The city consists of the old town, the suburb of Essling, the upper (or rich) suburb, and the new streets and suburbs built under the late King Frederick. These however have been all thrown into one, every mark of separation between them being removed. The old part of the city consists of two streets, being the houses, for the most part, of wood. The more modern parts have straight streets, intersecting each other at right angles, and contain many handsome buildings. The new royal palace, in particular, is a noble edifice, consisting of a centre and two wings; it has an extensive park, and in front of it is the spacious parade. The gardens and grounds of the palace are very fine, and extend to the new royal country-seat of Rosenstein, near Kannstadt. The palace contains a good collection of statues and statuettes, and windows command delightful views over the adjacent country. In the vicinity of the palace there are several public institutions. Among other buildings deserving notice (of which Stuttgart has, in proportion to its size, a great number), the Gymnasium, the university, which is the former military academy, which resembles a palace, the old palace, the opera-house (one of the largest in Germany), the hotel of the department of foreign affairs (formerly the palace of the crown-prince), the royal mews, the palace of the king of the Germans, the university hospital, the three principal Protestant churches, the Roman Catholic chapel, the French Protestant church, and the three barracks, which are among the most considerable buildings in the city. There are numerous public and private museums, the cabinet of curiosities, the library containing 200,000 volumes, among which is a unique collection of 12,000 bibles, of 4000 different editions, in 68 languages. The king's private library of 30,000 volumes is to be added. In the numerous manuscripts and a great variety of splendid modern publications. Stuttgart has a gymnasm, an academy of arts, a school of arts, a botanic garden, a veterinary school, a topographic-statistical society, a savings-bank, a Bible society, and numerous schools for other useful purposes, the poor, and charitable institutions of all kinds. The institution called Katharinenstift is a school for girls, founded by the grand-duchess of Oldenburg, sister of the emperor of Russia, who was in England with the emperor Alexander, and after the abdication of the Empress of Prussia died in Stuttgart. The population of Stuttgart is 35,000, with the garrison and strangers. There are manufactories of linen and woollen cloths, silk, cotton, gloves, carpets, shawls, &c., and the place is noted for its beautiful works in gold, silver, and damascene. It has excellent mathematical, optical, and musical instruments; cabinet furniture, lacquered ware, and carriages. The back-trade is extremely flourishing.

The history of the city does not carry us back into remote antiquity. The name of Stuttgart first occurs in 1229. It appears however that it was a fortified town in 1286, when it was besieged for seven weeks by the emperor Rudolph I. In 1320 the sovereigns (then counts) of Württemberg have been the capital of all the possessions of the house of Württemberg. Near Stuttgart is the beautiful royal country-seat, the Solitude, situated on a mountain.


STYLA'RIA. Lamark's name for Natis proboidea, one of the Abranchious Setigerous Annelids of Cuvier.

STYLA. [Botany] [Stroma.]

STYLET. [A manner of writing, from the Latin stylo, the same word with the Greek στῦλος, a 'pillar' or 'column': στῦλος probably contains the same element with τοῦ στῦλος, to 'place' or 'make erect,' and with the verb στρύμειν. The Romans gave that name to an iron hodkin (spatula) with a handle, on which they wrote by exaration, or scratching, on their wax covered tablets or note-books; and from the instrument of writing, the term was transferred to the writing itself, and that

too considered in reference not to the form of the charac-
ters (which would have been the more immediate trans-
form, but to the mode of expression. Among the Romans,
however the term, in this figurative application of it,
retained always considerably more of its antecedent
meaning than it does with us. We say not only style of writing
and style of painting, but style of painting, style of architect-
ure, style of dancing, style of dress, style of anything in
which form or manner is conceived to be, in however slight
a degree, expressive of taste or sentiment—if even this much
distinction still remains between what is called style
and mere manner in the widest or loosest sense.

The expression style might therefore mean a bad
style as well as a good style. Yet when the word stands
alone, we always understand it in the latter sense—just
as when we speak of expression in painting or in music, we
mean only the expression of feeling, not the work as a
proper plan, and make the true definition of a
style. This however is merely to tell us, what is sufficiently
obvious, that the art of expressing thought by language
consists in two things: first, the selection of words; second,
the expression or arrangement of those words. That transmittance of
style, both this selection and this collocation must be pro-
ter, there can be no doubt; the only question is, what con-
stitutes propriety as to such matters. Style has been some-
times considered as nothing more than the image or out-
line of the thing; but a language is always expressive in a
same sense in which it may be said that the impression
upon the wax is the creation of the seal; and it has been
assumed that all that is necessary for the ensuring of
a style of any degree of excellence is the possession of
a correspondent power of expression. But here again it
satisfies us that this is an insufficient explanation. Of
two men equal in powers of mind, and equally in possession
of a subject, nothing is more common than that the one
should be able to express it much more clearly and effec-
tively than the other. Language is of a form of language,
which must be learned like that of any other instrument.
As a man may have a high capacity for music, and may
have a perfect idea of a tune in his head, or may even be
able to play it on the violin, so a man may have the intellectual powers which
fit him for excelling in oratory or poetry, without having the
knowledge or command of language necessary to give them
adequate effect. Style is rather the vehicle than the mere
expression of thought, and this is the point at which
the vehicle is wanting. To some extent also it may be
said to be the dress of thought, or that which ornaments
and sets off thought, not only by the added charms of sound,
but by other powers which are inherent in words, and
of which one is their delicacy of sound, and another perhaps
that by the application of which we can almost without
thought that 'breathe,' so there are words that burn—
that by their associations excite impressions of the grand,
the pathetic, or the humorous, whether they are addressed
to the ear merely to the eye. And great effects are also
achieved by the general effect of sound, and the production of melody and cadence, but in a higher kind of
gratification or excitement—as by the luminous disposition
of all the parts of the sentence, by the presentment of every
term at the place best fitted to bring out its whole import,
by all the resources of what we may term call-by-name
ellipsi, and other figures of speech; which indeed, where-
ever they are properly used, are no deviations from natural
syntax at all, but, on the contrary, the most natural forms
of expression. If we in every case whose thought it is,
not in every case, it is nevertheless true that, like all the other arts the
pose of which is to give expression to mind, the guiding
and controlling principle of its exercise, its life and being, as we
may say, must ever be as exact and sympathetic a con-
vivie of thought, a sympathy of the thought itself. Whatever more style is than the mere expression of thought,
that much it must be at least. A powerful thinker may
not always be a powerful writer, but no man can be a powerful
writer who is not a powerful thinker. Even the human
organism would be far stronger, more perfect, and more
without a corresponding degree of clearness of thought.
We sometimes meet with a perspicuity which is little more
than grammatical, and hardly belongs to style at all; but
even that implies distinct conceptions so far as they go—a
reason why it is that no one, no matter how much he
accustoms himself to the habit of expression, can give
ness of intellect. And as for all higher attributes, it is
manifest that they cannot be found in the style, if they do
not exist in the mind of the writer. The only elements


from which a man's words can derive the animation of true passion, or poetry, or wit, must be his own head and heart. The lowest kind of writing that deserves the name of a style at all (unless it is to be called a bad style) ought, as we have observed, to be perfectly perspicuous, that is to say, readily and completely intelligible in so far as the standing of things makes it necessary by the knowledge of the language. The subject may be a difficult one, but that is only a reason for more pains being bestowed to make the style clear and easy, by a lucid arrangement and the avoidance of the earlier part of what is absurd; though this rule may be justly insisted upon where nothing beyond such perspicuity is desirable. It will not be so rigidly enforced in regard to the higher kinds of style. Here some sacrifice of perspicuity is at times to be submitted to, for the sake of effect. In short, the writer should not be otherwise attitude. Aschylus, no doubt, might have made his choruses, Pindar his odes, Tacitus his historic pictures, more easily comprehensible, better fitted for the use of such readers as would always read while they read, by greater diffuseness and dilution of style; but much more certainly would have been lost than gained by the attempt. Facility of being understood is a valuable quality in a style which has 40 other attractions; but it has been granted that this is not so desirable as to be gained at the expense of nearly every other. The poets and orators have been accustomed to speak of it. What is to be desired in the highest kinds of writing, as in the highest creations of all the fine arts, is not perfect comprehensibility at a glance, but rather that fulness and profundity of meaning which, in the course of time, is to exhaust any something new to be seen and felt every time we return to the work.

In every cultivated language however the progress of style is decidedly towards more and more freedom in thought, as far as depends upon the precision of phrase, and the use of words in certain limited meanings. This has been remarkably the history of the English language, at least for the last two hundred or two hundred and fifty years. The few old English grammatic forms and our rules of syntax to an extent that would surprise most persons if the evidences of it were stated in detail. Whether all that has been done in this way has really improved the language,—whether it has been thoroughly rendered more florid and more poetical for the various ends which a language ought to subserve, may perhaps be questioned. The gain in point of precision may possibly be more than balanced by the loss both in ease and in variety of style. We will instance one of the more obvious of the defects of the English language. To make a very great cry, the asserted necessity of always making that the reference of the personal or relative pronoun should be to the last-mentioned substantive of the same genus and number: I mean, for instance, that the use of the pronoun is nor has been observed in the practice of any writer as it is laid down in the grammars: the reference of the pronoun is always not to the most proximate, but to the most prominent, of the antecedent substantives,—to the one who is nearest to the reader's mind, and most uppermost in the reader's mind; that is the actual, as it is the natural reference, and it would be absurd that the pronoun should be used upon any narrower principle. But in former times even that principle was by no means rigidly adhered to. If we turn, for example, to the 'Fair Queen' we find Spenser, certainly one of the greatest masters of language that ever wrote, and who has applied all the resources of his own English at once with the most consummate skill and the most consummate art, and who in every stanza, perform all sorts of services, and refer to almost any preceding substantive he pleases, wherever they may be placed. Nor is this licentiousness attended with any practical inconvenience. It may be a matter of dispute which have been more justly reproaches, but this soon wears off; the meaning of the passage is usually as obvious as if the modern rule were ever so carefully attended to, while the advantage which the disadvantage of it gives in point of spirit and freedom to the composition is not lost.

In another respect however English prose eloquence has undergone a change of character in an opposite direction, by the greater infusion which it has received of a colloquial tone and phraseology within the last century or a half. Again, within the last century, we have arrived at the language of books, except in the comic drama and other light compositions of a kindred character, generally preserved a formality of gait and manner which distinguished it nearly as much from living conversation as the critics have held that the language of verse should be distinguished from that of prose. Among the most eminent of the writers who first broke the spell of this spirit of decorum, Cowley, in his Essays; Dryden, in his prefaces and other prose works; Sir William Temple, and the third earl of Shaftesbury. The example set by them was followed by Swift, Addison, Steele, and their associates and imitators, till in the last century, the influence of that manner of gracefulness, which had thus become fashionable, threatened to degenerate into a slovenliness, or shambling fluency, alike without either elegance or precision. It must be admitted, that of all the writers of the second quarter of the eighteenth century, none were in a better condition to be defended may be entertained of his depth of thought or weight of matter, wrote the best style, at once the most flexible and idiomatic, and the purest, most refined, and most classical. But probably the writer who wrote the whole did most to restore measure and emphasis to our prose style was Johnson: his manner has not been much copied in all his peculiarities or in its entire character, but yet more or less of its influence may be detected in the style of the more recent writers, and of those who have subsequently appeared among us, including even such diversities as the sonorous innanity of Macpherson's 'Ossian,' the epigrammatic point and terseness of Junius, and the brilliant false of Gibbon. At the same time however examples of what is called occasional style, and the fact, that there have been so many new things produced; the rules of grammar and the practice of Junius, and the brilliant false of Gibbon. At the same time however examples of what is called occasional style, and the fact, that there have been so many new things produced; the rules of grammar and the practice of Johnson, in giving the English language a more vigorous and spirit that has been put into literature, as into all things else, by the political and social convulsions of the last fifty years. These two influences, though thus apparently opposite in origin, have proved rather mutually assistant than contradictory.

Purity of style is more intimately connected with many apparently higher things than is commonly supposed. Marking on 'the power and value of words, and the duty as well as advantage of using them appropriately,' Coleridge says (in a note to his essay on the Church and State, '1830, p. 19), 'Many years ago, in conversing with a friend, I expressed my belief that in no instance had the false use of a word become current without its soon becoming a fashion to use it in a turn opposed to the true; as in the day that P. C. No. 1445.

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the comparative slovenliness and incorrectness of extemporaneous precipitation were allowed to carry it over the best efforts of deliberation and care. There is always danger however of something of this happening whenever extemporaneous drafting is much in evidence; and where the practice of public speech-making prevails to a great extent among the imperfectly educated classes, the case is of course so much the worse. There is reason to fear that such an influence is acting, along with other causes (Americanisms), to degrade the English American; and where the barbarisms in use are the result of an inflated, big-worded, loud-sounding style, which is about as offensive to good taste as the noisy exaggerated eloquence of a person half drunk always is to a sober man. The specifying or preaching style seems to threaten to become the only style even for written composition in the United States, and its standard the violent vociferation and empty rumple of the newspapers.

STYLE, OLD AND NEW. By the Old Style is meant the mode of reckoning time anterior to the Gregorian reformation of the calendar; and by the New Style, that adopted since. The adoption of the reformation at different times by different countries, renders it necessary to remember the difference of their reckonings, as follows:

The reformation took place in 1502; from thence to the end of February, 1582, inclusive, the year is seven days in advance of old style: thus January 1 (O. S.) is January 11 (N. S.), and so on.

From and after March 1, 1700, to the end of February, 1800, the year is seven days in advance of old style: thus January 1 (O. S.) is January 12 (N. S.).

The new style was adopted in England by 34 Geo. II. (1751), which enacted, 1. That the year 1752 should begin on the 1st of January instead of the 25th of March, which was the case with the old style. 2. That the 3rd day of September, 1752, should be called the 14th, or that the days from the 3rd to the 13th inclusive should have no nominal existence. Accordingly, the year 1751 had no January, February, nor March up to the 24th inclusive; and September 1751 was composed of 27 days.

According to Sir Harris Nicolaus, the new style was adopted as follows: by Denmark, France, Holland, and most of the Low Countries (some towns excepted), most of Italy, Lorraine, Portugal, and Spain, in 1582; by Germany and the States of the North in 1585; by the Hungarians in 1587; by German and Swiss Protestants, and the remaining parts of Holland, &c. in 1700; by Tuscany in 1749, or 1751; and by Sweden in 1753. It is not yet adopted in Russia.

It was at one time sometimes the mode to express the date in both styles. We have an old letter written from France to Holland in 1619, as we should now call it, the date of which is Février 29, 1619. [Periods of Revolu-

STYLES OF ARCHITECTURE. All the principal styles have been spoken of under the heads of Civil Architecture, Domestic, Italian, French, Spanish, Mexican, Moorish, Norman, Roman; and to them may here be added some subordinate styles, which are to be considered rather as peculiar and temporary modes, than distinct, independent, and established styles. Such are those known by the appellations of Burgundian, Flamboyant, Cinque-cento, and Elizabethan. Of these the two first mentioned are peculiar to France; and the Burgundian may be considered as corresponding with our own Tudor, since it exhibits, with many points of difference, many also of resemblance, with the adornments of several character as to enrichment, and the adoption of very flattened arches, or horizontal lintels, for the openings of windows. Château Fontaine le Henri and several other examples of this style may be seen in Pugin’s ‘Antiquities of Normandy.’ Flamboyant is a term that has recently been applied to that species of French Gothic whose tracery is entirely composed of flowing curves, forming not a perfectly symmetrical pattern. The name has been bestowed from the fancied resemblance to the waving outlines of the portals of Abbeville, Beauvais, Saint-Ouen, and St. Maclou at Rouen are fine specimens of this style. Cinque-cento, otherwise sometimes called the Renaissance style, is that which arose on the first attempt to revive and apply the classical orders without any regard to their original character. In Roman architecture, remains very widely from the principles of that of Greece, the Cinque-

Stylistum ...
The Himalayas, Ceylon, and the South Sea Islands. Their properties are unknown.

STYLIDUUM (a diminution of stype, a column), the name of a genus of plants, the type of the natural order Styloideae. The essential characters of this genus are: calyx 2-lipped; corolla irregular, 5-parted, form of the segments equal, the fifth smaller, forming a label, which is deflected; column consisting of filaments and style, reflexed, with a double curve; anthers with two lobes widely separated; stigma, separate; ovary, carpellary, or the dispermous sometimes uniformly incomplete. This is chiefly a New Holland genus of plants, and is remarkable for its gynandroster structure, and for the irritability of the column formed by the union of filaments and style. Irri-

inability is seen in many genera allied to this, as in the indi-

sum of Goodenia. The part which exhibits movement on being excited is the curved column, and the irritability is confined to a small portion only of the column near its base. In the natural state the column projects from beyond the flower, and hangs down over the smaller petal or label-
lum, and the irritable part of it is in contact with the label-

The movement of the column consists in raising itself from this deflected position to that of perfect upright-

The column does not possess this power, for as the authors develop, this property of the column increases, and is at its greatest intensity at the time of the de-

cence of the authors, and entirely ceases when the im-

paction of the ovules has taken place. During this pro-

cess the authors also undergo a change; previous to dehis-

ence, the central part of the tube which carries the stigma, but after this pro-

ces taken place, the stigma is fully exposed, and remains so. The irritability is then developed with the author: it is at its greatest height whilst the author is performing its function, and ceases with the function of that organ. The move-

ment of the column is produced by external stimuli or the application of a solid body, Exposure to heat will eret the column, and its withdrawal, cause it to return to its natural position. After returning to this state, it requires that fifteen minutes rest before it will again exhibit irrita-

When elevated, the column cannot be made to re-

force by force to its bent position. When the movement takes place naturally, it is slow and regular, and when under the influence of artificial excitation, it occurs suddenly and by jerks. The whole of these movements is evidently connected with impregnation, and it seems that the pollen is conveyed to the stigma whilst the column is upright, which could not be the case whilst it was dependent.

The species of this genus described by Mr. Brown, in his 'Phaenomena Nova Hollandiae,' are forty-five in number; besides these there are two or three natives of the East Indies.

STYLIFER, or STILIFER, Mr. Broderip's name for a new family of Pectinibranchiata, characterised by him (1823) under the name of Stylifer. Several of these species were brought home by Mr. Hugh Cuming.

Generic Character.—Shell hyaline, turbinate, the apex of the spire micrones. The aperture subovate, acumina-

The external lip acute and rounded.

Animal. The mantle thick, fleshy, and cup-shaped, covering the last whorls of the shell. The proboscis very long and retractile. The tentacles round, thick, subacumen, and situate at the base of the proboscis. Eyes very small, sessile at the base of the tentacles. Stem of the branchia solitary. Animal marine, penetrating into the integument of the star-fish.

Example, Stylifer Astericolor, Brod.

Mr. Broderip states that the arrival of this species with the soft parts had afforded data for a generic character, indicating a distinct family among the Pectinibranchiata, the form of whose mantle differs from any other genus of that order. This mantle, which is of a green hue, is thick, fleshy, and cup-shaped, with a small aperture at its base, a free posterior margin, enveloping the soft parts and the last volutions of the shell, which has thus somewhat the appearance of a small acorn set in its cup. On the ventral aspect of the mantle is the rudiment of a foot, and from the small basal aperture a retractile proboscis (which, when exerted, is as long as the whole animal) is protruded. At the base of the proboscis are two thick, round, somewhat pointed tentacles; and at the base of them are the eyes, or rather, ocular specks without pedicles. The branchia is placed on a single stem. At the base of the proboscis is a spherical muscular stomach, and the intestines ascend into the spire of the shell, where it becomes attached to the liver, which in S. Astericolor is of an orange colour.

Mr. Cuming found this elegant parasite burrowed in different parts of the rays of the oral disc of Asterias sol-

litoris. It was almost hidden from sight, so deeply does the animal penetrate into the substance of the star-fish, in which it makes a comfortable cyst for itself, and wherein it most probably turns by the aid of its rudimentary foot. All the specimens infested with these tentaculous mollusks appeared to be in the best health, though there is reason to believe that they feed upon the juices of the star-fish.

Mr. Broderip observes that Stylifer (with that instinct of self-

preservation which is imparted to all parasites whose exist-

ence depends upon that of their nids) appears, like the larva of the leech, turned against its kindred among insects, to avoid the vital parts; for in no instance did Mr. Cuming find it imbedded anywhere save in the rays, though some of the individuals had penetrated at their base, and very near the disc. When extracted, the older shells have the appearance of a milky-clouded glass bubble: the younger shells Mr. Broderip found of an unclouded transparency.

Mr. Broderip remarks that Dr. Turton, in the second vo-

lume of the Zoological Journal, p. 357, pl. 13, describes and figures a shell under the name of Phasianella sti-lyfera, adding that he found a dozen attached to the species of Echinus escuclentus dredged up in Torbay. Mr. Broderip ob-

serves that it is clear that Dr. Turton's shell is not a Phas-

ianella, for it is described as having no operculum, and the similarity of the shell leaves no doubt, when joined to the parasitic habits of the animals, that it is one of the conge-

sters of Stylifer Astericolor. Mr. Broderip therefore names Dr. Turton's specimen Stylifer Turtoni.

Stylifer Turtoni.

Natural size and magnified. (Sowerby's Genera.)

Mr. G. B. Sowerby furnished Mr. Broderip with a third species, which, though its habits were unknown to the latter, he considers to be referrible to this genus, and he

Stylifer subalba.

Natural size and magnified. (Sowerby's Genera.)
nymes its Stylifer sublatatus; it is so beautifully transparent, that its fine specimens the column can be as distinctly perceived through it as through water, and it is long, apsid, which consists of many close-set whorls, is generally oat of the perpendicular. (Broderip, in Sowerby's "Genera of Recent and Fossil Shells," No. xxxviii.)

The characters described by Mr. Broderip will be found in the Proceedings of the Zoological Society of London for 1832; and in Th. Müller's "Synopsis Testaceorum," Berlin, 1836.

STYLOBATE. In its general meaning this term sig- nifies any sort of basement upon which columns are planted to raise them above the level of the ground or floor; but in its technical meaning it is applied only to a continuous unbroken pedestal, upon which an entire range of columns stand—in contradistinction from pedestals, which are merely detached fragments of a stylobate placed beneath each column. So far were the Greeks from considering the stylobate an integral part of an order, that they very rarely employed it, but placed their columns immediately upon the floor of the elevated platform of the gradinum, or steep steps, which served as the basement of the temple, and which were generally continued on every side. It was only in particular cases, such as where steps were confined to one end or the front of a building, that, whether columns were continued up or not, a small basement added to those side elevations, equal in height to the ascent of the steps, or the difference of level between the ground and the pavement of the portico; which basement was treated as a distinct pedestal to the whole building.
The Romans, on the contrary, have considered the stylobate, as it were, the pedestal itself; and taking it hence upon itself, they have considered pedestals of that kind to be almost essential to an entire order, and have laid down proportions accordingly, which are in themselves exceedingly faulty, being much too high. At the best, columns upon detached pedestals always look as if placed upon stilts, and where such pedestals are as high as they are sometimes made—onethird, or even more of, the column itself—the columns seem to stand very meekly, and the effect is very much like that of a round column immediately placed upon a dais of equal elevation. Another evil resulting from such prac-
tice is that the order itself, or columns and entablature, loses much of the importance, and the entablature ceases to be in proportion to the united heights of the column and additional stylobate or subcolumn beneath it and in continuation of it. Unbroken columns are unperceptible, or where there must be some balustrading or parapet between columns, for the sake of security, and then they should be no higher than what conven-
ience requires, pedestals should be avoided altogether. A stylobate, on the contrary, may be so employed as to give additional dignity to an edifice, without detracting from or interfering with the order itself, since it gives the whole structure an appearance of solidity in its lower part. The portico of the National Gallery owes much of its effect to the circumstances of its being elevated upon a solid unbroken stylobate, which is however too plain in itself to accord with the order, and even looks poor and unfinished, from the want of a suitable socle and base mouldings.

STYLOCRUS. [D. xxiv, vol. vii, p. 362.]

STYPTICS (from styre, "to stop"), agents which check the flow, generally of blood, from a relaxed or ruptured vessel. They are a kind of astringent, and the principle of their mode of action has been already detailed. [Aeron. vol. iv, p. 70.] The only reap pruding notice here is to enforce the necessity of their prompt administration, as the natural disposition of the blood to coagulate becomes less and less as it continues to flow, till fainting be induced, and a cessation of the current results, after much injury is done to the system. The bleeding may at any time be stopped, or frequently the case with young persons, from whose nose blood frequently flows, even when perfectly quiet, but still more frequently when running or lifting some heavy weight, or it may be the consequence of a wound, such as a lacerate, or of the extraction of a tooth, or caused by some cutting instrument. Those astringents are alone entitled to be called styptics which can be applied directly to the bleeding orifice; and of these some act chemically, others vitally, and others merely mechanically. Of chemical styptics, a saturated solution of alum, or sulphate of zinc, or creasote, are the best. Strong acetic acid acts both chemically and vitally. When blood continues to ooze from the socket of a tooth, it is a useful plan to plug it with a sponge-test, which, as it expands, quite fills up the socket, and restrains the hemorrhage.

STYRACEE, a small natural order of plants, placed by Lindley in his polytropical group of monopetalous Exogeen. The species are trees or shrubs, with alternate leaves without stipules, usually turning yellow in drying. The flowers are axillary, and are either solitary or clustered with mem-
branous or bracteate calyx. The calyx is persistent, and has five divisions; corolla with divisions, frequently differing from the calyx, and with imbricated or petalline stylus; stamens varying in number, arising from the tube of the corolla, with 2-celled anthers; ovary 3-celled, with few ovules, a simple style, and capitata stigma; fruit a drupe; seed solitary, with the embryo lying in the midst of albumen. This order is nearly allied to Ericaceae, from which it differs in habit, its definite seeds, and its frequently inferior ovary. It differs from Ebenaceae in its stamens being perigynous, in the inser-
tion of the ovules, and its simple style. It is however an order on which there are many different opinions, some re-
ferring all its genera to Ebenaceae, whilst others separate from it the genera Symlocos and Halesia as types of dis-

tinct orders.

The species are found in the temperate and tropical parts of North and South America, and also in Nepal and China. This order is chiefly remarkable, in an economical point of view, for furnishing the Storax and Benzoin of commerce, which contain a peculiar acid called the benzoin. Some of the species are used for dying yellow, and a species of Alstonia is employed as a substitute for tea. The various species of Halesia are the snow-drop trees of Carolina.

Styrax officinalis. a. Branch showing leaves and clustered flowers; b. corolla opened with perigynous stamens and style; c. fruit covered with stomata; d. transverse sect. 9 mm. long. e. flower in long view. f. stem, showing calyx in the midst of albumen.

STYRAX (or styrax), the name of a genus of plants forming the type of the natural order Styraceae. It has a persistent campanulate 2-toothed or 5-toothed calyx, monopetalous deeply 3-5-cleft corolla; 10 stamens, 10 ovules on a single column of the base, with linear 2-celled anthers; superior ovary with indefinite ovules, with simple style and 3-lobed stigma; fruit a dry drupe; seed with a double testa, invented em-
brane, and fleshy albumen. The species are elegant trees and shrubs, mostly covered with hairs having a stellar or pubescent texture, with entire leaves and white or cream-coloured racemose flowers. They are principally natives of America and Asia; one is found in Europe and one in Africa.
Styrax officinalis, official Storax: leaves ovate, downy beneath, shining above; racemes 5-6-flowered, simple, shorter than the leaves. It is a native of Syria, Italy, and most parts of the Levant. It is common all over Greece and the Peloponnesus, where Dr. Sibthorp found it retaining almost the same designation as that given by Theophrastus and Dioscorides. It has been metastalled as a monitors, and it was first cultivated in England by Gerarde, but is still a rare plant in this country. One of the finest specimens is in the Botanic Garden at Chelsea, and is annually covered in May and June with a profusion of blossoms. The flowers are white, as is that of the Storax which is admitted into the Materia Medica of the London Pharmacopoeia. [STYRAX]

There is however another Storax known in commerce, with which this must not be confounded, and which is the product of an entirely different species. This is the Storax which is produced by the Storax which is admitted into the Materia Medica of the London Pharmacopoeia. [STYRAX]

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S. Benzoins, Benjamin Storax, or Gum-benzoin tree: leaves ovate-oblong, pointed, glabrous above, downy beneath; racemes compound, almost the length of the leaves. It is a native of Syrca and Java. It is the great tree which produces the gum Benzoins or Benjamin of commerce, and which, as well as Storax, is used in medicine. [BENZONIN]

The great consumption however of these resins is not as medicines, but in their use as incense in the worship of the Roman Catholic Church. In this respect, and gradually becoming more and more dispersed among other nations, as Graamas, Griam, and others, were acquainted with the tree that yielded Benzoins, Ray confounded it with the genus Laurus, and Linnaeus with the generic Croton and Tormi- 

S. grandifolius, large-leaved Styrax: leaves broad, obovate, pointed, slightly serrated, green above, downy beneath; lower peduncles 1-flowered, solitary, axillary. A native of the following American States: New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, and Indiana. There are several other species described from South America, mostly from Brazil. The hardy species of Styrax are well adapted for shrubbery, and for the purpose of foliage and handsome flowers. They may be propagated by seeds sown in pots of light soil and exposed to warmth, but the best mode is by layers, which should be put down in autumn or spring.

STYRAX OFFICINALIS is the source of the official storax, a beautiful wood of commerce, which is obtained from the Liquidambar styraciflua, and perhaps other species of Liquidambour. Of genuine storax there are several varieties, and of those known to the antients many are now altogether unaccountable, while those mentioned in the following table are the only species of importance.

The tree grows in Greece and Asia Minor, and is cultivated in the south of France, in which last no resin exudes, except occasionally, after very warm summers. Asiatic Turkey supplies whatever is met with in commerce. It is procured by incisions in the bark, or perhaps from the punctures of insects. What flows from these openings is a liquid resinous substance, which concretes into small balls, about the size of peas; these, aggregated into larger masses, give rise to the great diversity of the storax. Another form is called amygdaloides, also of great rarity and extravagant price. It is sometimes termed calamita vera. The commercial article is of various degrees of purity and excellence, and is denominated by Storax. It is said that Mr. Storr's storacina. This always contains more or less sawdust, mixed with variable quantities of resin. It is generally in large round cakes, of a brown colour, verging to red or black, with fragrant odour, brittle, and friable, but softens in air, and if kept in a cool dry place. It is a valuable and laudable virtue. It is considered to be an artificial compound, prepared chiefly in Venice and Trieste. According to the analysis of Reinsch, it contains—volatile oil, a trace only; resin, from 2 to 3 per cent. in different specimens; benzoic acid, from 1 to 2 per cent.; gum, 7 to 14; woody fibre, 20 to 27; ammonia, an insipplicable quantity.

Storax is stimulating in a degree dependent on its purity. For medical purposes it is directed to be purified by solution in alcohol, straining, and afterwards distilling off the spirit. The residue is then used in a few preparations, such as tinctures and pills. It formerly entered into a multitude of compounds, but it has been greatly discredited, from the extensive adulterations practised with it, and it might be altogether supplantedit by benzoin. It is much used to form pastilles, and for fumigators. The bark is called cortex Thymiananis, or cortex thuris, from which, by boiling, a liquid storax is procured, as well as benzoin. There is a storax from Bogota, but its source is unknown.

STYRIA, THE DUCHY OF, in Austria, is situated between 45° 34' and 47° 50' N. lat., and between 13° 30' and 15° 6' E. long. It is bounded on north and north-west by the archduchy of Austria, on the south by Illyria and Croatia, and on the east by Croatia and Hungary. The area is about 8500 square miles, or about one-fourth of that of Scotland, and the population, about 750,000 souls. The western and northern part of the country is covered with high mountains, which are called by the general name of the Styrian Alps. Properly speaking, they are two great branches of the Julian Alps, which extend to the east; one of these branches separates the valley of the Etsa from that of the Mur, runs south-east, as far as the Wild Alps, to the west of Semmering, where it joins the Noric Alps, and then proceeding in a south-easterly direction forms the boundary towards Austria below the Etsa, extends into Hungary, and is called the Etsa Alps. The other branch divides the valley of the Mur from that of the Drave, and forms the frontier between Styria and Carinthia. To the south of the Mur the Bacherian chain is the continuation of these mountains, and the third mountain-chain runs from Loibl to the Save, and forms the boundary towards Carinthia. None of the mountains rise to the line of perpetual snow; on the north-western there are some glaciers, but still below the absolute snow-line. The highest peak in Styria is the Grossenberg, 8381 feet; the Eisenhut, 7676 feet; the Grimming, 7440 feet; the Stangalpe, 7140; the Hochschwa, 7154; and the Bachstein, 7008 feet, above the level of the sea. The southern and eastern part of the province contains many lofty mountains, which are partly covered with vegetation, and numerous gentle eminences, some of which are separated by extensive valleys. In conformity with the physical character of the country, it is divided into Upper Styria, which comprises the smaller north-western portion, and Lower Styria, which is the south-eastern, and larger, lower, and level portion.

' Styria,' says Blumenbach, 'is properly a mountainous country, but with the richest diversity; a wild, romantic, beautiful region, which surpasses in magnificence and variety of the finest English park. Through the whole country there is an alternation of lofty peaked rocks and perpendicular walls, flowery meadows, lovely valleys, dark impenetrable forests, rushing waterfalls, peaceful lakes, rapids, &c., and Pies are many as the stars in the heavens, all of which flow into the Danube, and for the most part by an east course. The principal rivers are, 1st, the Mur, which rises in a lake, traverses the centre of the country for about 180 miles, is joined by many smaller rivers, and enters Hungary at Maut; 2nd, the Drave, which enters Styria below Hofenmann and, enters Croatia at Fridau; 3rd, the Etsa; 4th, the Raab. The Save only touches the southern frontier, towards the government of Leibach, but is joined by the Slin and the Sota, the latter of which bounds for some distance the southward, and is the last frontier stream. The Mur, Drave, Etsa, and Save are navigable by boats. There are no large lakes, but many small ones. The largest are, the Grundesel, above 715 Austrian acres in extent, in many others. The Mur and Drave flow 100 feet above the level of the sea; the Altenauensee, 858 feet; the Pies are many as the stars in the heavens, all of which flow into the Danube, and for the most part by an east course. The principal rivers are, 1st, the Mur, which rises in a lake, traverses the centre of the country for about 180 miles, is joined by many smaller rivers, and enters Hungary at Maut; 2nd, the Drave, which enters Styria below Hofenmann, and enters Croatia at Fridau; 3rd, the Etsa; 4th, the Raab. The Save only touches the southern frontier, towards the government of Leibach, but is joined by the Slin and the Sota, the latter of which bounds for some distance the southward, and is the last frontier stream. The Mur, Drave, Etsa, and Save are navigable by boats. There are no large lakes, but many small ones. The largest are, the Grundesel, above 715 Austrian acres in extent, in many others.

Like all countries that abound in limestone mountains, Styria has numerous caverns, the most interesting of which is the Mittert cave.
Natural Productions.—These are, the common domestic animals, with game, poultry, fish, and bees. The breeding of horses is the most important pursuit in Styria; the race-horses for the Turin and Vienna trotting meets are celebrated, and small and, as usual in the Alps, are driven in summer to the highest parts of the mountains, and brought back to the plains in autumn. Sheep are not numerous, and the horses are not superior in style to those of the Tyrol. The vegetable products are very diversified: wheat, rye, barley, and oats, though not abundant in Upper Styria, are of remarkably fine quality. In Lower Styria there are likewise maize, millet, and buckwheat, pulse of various kinds, and culinary vegetables, which the cold climate and culture of the country render very necessary. They have not in this respect so far been able to make up for the defects of the soil, but this is intended to be remedied in the future.The iron mines in Styria are of the oldest known, and have been worked for several thousand years before the Christian era. The mountains are not very rich in mineral productions. The chief products are copper, lead, iron, zinc, and copper, though the whole country is relatively poor in iron. The most important minerals are—silver, copper, lead, iron, and zinc. The iron of Styria is worked in the mines at Hassfurt, in the district of Triesch, and consigned to the trade of Austria, the iron of Austria, the large iron-manufactures are chiefly supplied from Styria, and partly, by way of Vienna and Trieste, to France and England. There are a few manufactories of linen, cotton, wool-wen, and silk, but none of consequence. There is a considerable trade in vegetables, which mountain does not contain the ore in veins or strata, but presents a solid mass of iron-ore, which has been wrought without interruption for eleven centuries. The iron-mines in the county are chiefly copper, steel, iron, copper, and lead. To Austria, Hungary, and Ruman Turkey, are sold (a million), sickles (200,000 in a year), steel, and some other iron-wares, to Italy, France, Poland, and Russia. Among the smaller articles of iron, several millions of Jew’s-harps are annually exported. The imports into Austria consist of the following fine articles:—linen, cottons, silks, and jewels, iron Venice, and colonial produce from Trieste and Fium. The transit-trade between Italy and Germany, from Vienna to Trieste, is very important. This trade is greatly facilitated by the good roads and canals of Austria, which many other great roads branch off to the Tyrol, to Ljung, to Olon in Hungary, and Carlsbad in Croatia. The principal commercial towns are Gratz, Pettau, Leoben, Rakersberg, and Marburg. The government is like that of the other Austrian hereditary states; the emperor has the title of the Duke of Styria. The parliament, or estates, as they are called, consist of four orders—higher clergy, nobility, the deputies from the landholders, and the deputies from the towns. Religion and Education.—The inhabitants consist of two nations: Germans, who are the majority (above two-thirds), and Greeks, who are of Slavonian extraction, and speak their own language. The Germans, who inhabit all Upper Styria, the imperial forest, and of Mur and Enns, are tall, handsome, robust, good-tempered, and industrious race. The Greeks are weak, thoughtless, dissolute, and bigoted. The great majority of the people are of the Roman Catholic religion, the Lutherans not being above 10,000 souls. The chief religious institutions are, the University, two theological schools in convents, four gymnasia with sixty-eight professors and about 1500 students, and 637 Roman Catholic and 4 Protestant schools. There are, besides, several other schools for special purposes. The hospitals, charitable, and other charitable institutions are very numerous. History.—Pliny and Strabo are the first authors who give any account of this province. The inhabitants were completely univilized, and harassed the adjoining provinces, till the reign of Augustus, when the country was subdued by Tiberius, and the eastern part invaded by the victories of Pompey, and the annexation with that of Noricum. The province was then celebrated for its iron, steel, and cattle; subsequently industry flourished in the towns, especially in Celeja (Cilli), Petrovium (Pettau), and other places. The province penetrated by the Goths, Magyars, and Sueves, and was so rapidly, that episcopal sees were established at Pettau and Cilli; but the irradiation of the northern hordes put an end to the prosperity of the country, which was successively overrun by the West Goths, the Huns, the East Goths, the Vandals, the Huns, the Magyars, the Sueves, the Amalas, the fifth century. In the sixth century the Slavonians established themselves in Lower Styria, and afterwards, when they had expelled the Avari, in Upper Styria, till they were overpowered by the Germans. The inhabitants, having conquered Styria, divided it among several counts; under his successor, the country suffered from the internal discords of its chiefs, by the invasions of the Bulgarians, and by the invasion of the Magyars, from whose yoke it was delivered by the Turks. The Turks obtained over them by the emperor Otto the Great, in the year 1055. The country was divided afterwards into a number of principali, of which that called the county of Steyer was successively enlarged to its present extent under rulers who bore the title of margraves, and after wards of dukes, till it was annexed, at the end of the twelfth century, to Austria, with which it has ever since been united. Various events checked the prosperity of the country, such as the repeated invasions of the Magyars and the decline of the Gothic power, which the Protestants had established near the end of the sixteenth century. The Protestants did not longer obtain till the diets held at Bruck, in 1575 and 1578. When the Turks were pressed by the Turks, was obliged to grant it, the greater part of the nobility, half of the citizens, and a considerable number of peasants having already embraced the new doctrines. The rapid spread of the Reformation had been greatly promoted by the school at Gratz, founded in 1568, while the archduke Charles was absent in Spain, which the estates of the duchy converted, in 1575, into a high school by the order of the Protestant princes, which the Protestants had established near the end of the sixteenth century. The estates, being determined to be of the Protestant church in the country, all Styria was re-annexed, by violence, to the Roman state. Supported by the garrison of the citadel of Gratz, which was considerably increased for the purpose, Ferdinand revoked his father's grant of the free exercise of religion, and commanded the estates to dismiss the Protestant clergy and teachers from all the churches and schools within fourteen days. On the 26th September, 1578, the teachers were strictly commanded to leave the city of Gratz on the 28th of November, and the hereditary estates at that time, on pain of death, and never to return to them. The Protestant high school was closed; a Roman anti-reformation commission was appointed, which boasted of having burned no fewer than 40,000 volumes of Protestant books; Ferdinand also expelled all Protestants from his dominions. The first step was, the prohibition of the Roman religion, or to sell their property, and with the proceeds, after the deduction of one-tenth, likewise to leave the country. Many professors of the doctrines of the Reformation, who abjured their faith, in order to remain in the land of their fathers; 30,000 others, of the richest and most distinguished families, and among them many of the noblest houses, left their native country; and lastly, others concealed their opinions, and cherished them in silence from generation to generation, for two centuries and a
half, till the toleration edict of Joseph II. allowed them openly to profess their faith.

(Haas; Stein; Die österreichisch nationalEncyklopädie; Conversations Lexicon; Blumenbach,Gen.
desc. d. einfluss u. m.)

STYX (Xer' or Xwyc' Uta), a small stream in the north of Arcadia, which is now called Mauroneros. According to Herodotus (vi. 74) its source was in the Arcadian town of Nomessa. Vitruvius (vii. 3) states that its water destroyed all the crops which those of Thebes, Athens, and Styx. When the gods of the ancients took a great oath, they always swore by the water of Styx, and awful punishment awaited him who swore falsely. The divinity of the river Styx was a nymph of the same name, who dwelt at the entrance of the lower world in a spacious grove supported by silver columns. (Hesiod, Theog. 776.)

SUABIA, one of the ten circles into which Germany was divided previously to 1806, comprehended the south-westernmost part of the kingdom of Wurttemberg, and formed a state independent of the kingdom of Wurttemberg. It was situated between France, Bavaria, Switzerland, and the north sea. Since 1806, it has formed a part of Germany. The territory of Suabia is 3,375 square miles, with 2,290,000 inhabitants. Its chief natural productions are corn, wine, and fruit, and in the mountainous parts minerals, and timber, which is floated down the Neckar and the Rhine to Holland. The country of the Suabians is situated on the left bank of the Danube. In Suabia, which has long been a warlike part of Germany, but when the Italian wars and the contest with the Turks prevented the power of the house of Hohenstaufen, and it became extinct on the execution of Conradin in 1268, its vassals, cities, prelates, and counts continued independent. Many Suabian cities joined the Rhenish Federation, founded in 1254, and Wurttemberg in some measure took the place of the extinct duchy of Suabia. This is not the place to enter into the details of subsequent events, the sufferings of the people from repeated war, and the struggles of the princes and their subjects, till the final dissolution of the ancient constitution of the empire, and the partition of the country among Wurttemberg, Bavaria, Baden, the princes of Hohenzollern, the prince of Liechtenstein, Austria, and the city-state of the town, the largest cities are Augsburg, Stuttgart, and Ulm.

The very name of Suabia has disappeared from the maps and gazetteers of Germany, and was only revived about three years ago by the king of Bavaria, who restored to the ten circles of the kingdom the ancient historical names, and gave that of Suabia to the circle of the Upper Danube.

(Conversations Lexicon; Hübner, Zeitungs Lexicon; Wimar Almanach, &c.)

SUAKIN, or SOUAKIN, a town or seaport in Nubia, on the west shore of the Red Sea, is in 10° 4' N. lat. and 37° 30' E. long., at the extremity of a narrow inlet, about twelve miles in length and two in width. The entrance of the bay is only about sixty fathoms wide, but it opens to the sea in such a manner that it is very difficult to enter or to leave the bay. But when the winds are from the south, there is a regular land-breeze every morning, which obviates all difficulties. The bay has a sufficient depth of water, generally varying between fifteen and nineteen fathoms. At the bottom of the bay there are several islands, on one of which the town is built. The town is separated from its suburb, called El Geff, which stands on the mainland, by an arm of the sea about five hundred yards wide. This arm of the sea, on the west side of the town, is formed by a projecting part of the continent. The arm of the sea on the west side affords no anchorage for ships of any size. The islands and all the surrounding country are sandy, and produce only a few shrubs or low grasses. The houses of the town have one or two stories, and are constructed of blocks of masonry. The inhabitants have a neat appearance, but the greater part of them are falling to decay. The suburb El Geff is rapidly increasing in size and population, and is now larger than the town itself; but there are few houses of stone, the greater part of the dwellings being formed of mats or rushes, with a few cases of Bedouin tents, dromedaries, coppers, and ornamental night clothes, and El Geff one mosque. The water of the wells, which are about half an hour from El Geff, is tolerable, but in none of them is it good. Burchhardt estimated the population of Suakin about 1800, of whom 3000 live upon the island and 6000 in the town.

Suakin is the most important trading-place on the west shore of the Red Sea. The inhabitants have no other pursuit than commerce either by sea or with the contiguous countries of Eastern Africa. They export the commodities which they receive from Eastern Africa to all the harbours of Haja's and Yemen, down to Mocha, but chiefly to Jidda and Hodeyda. Many of the merchants go to Sennar to buy their goods, and, after returning to Suakin, they perform the jals, and several kinds of provisions for which such African merchandise to the traders of the town, by whom they are exported to Arabia. They bring from Sennar, Cartouh, and Shendi, slaves, gold, tobacco, incense, and ostrich feathers; from Beled-el-Taks, a country situated on the west coast of the Red Sea, they bring the honey and brown wax which are exported to Arabia in tropical soda. A large quantity of butter in a liquid state, the only form in which it is used in this country, is likewise exported to Arabia, as well as gums made of gum-leaves, which are partly used to cover the floors of the mosques of Mecca and Medina, and partly bought by the pilgrims for the purpose of kneeling upon when they pray. These two articles are also obtained from the Bedouins in the mountains near Suakin. Horses and camels are also brought from the Bedouins, and are sold to the inhabitants of the Red Sea, and to the traders of Hodeyda, at Jidda.

The Suakin merchants purchase all the Indian goods which are wanted for the African markets and the consumption of their own town, as dresses and ornaments for women, household utensils, and many kinds of provisions for which such as Indian sugar, coffee, onions, and particularly dates, which are not produced in any part of Eastern Nubia. Much iron is also imported for knives and scissors, which are manufactured by common smiths, who are the only artisans in Suakin, except the carpenters and saddlers. They furnish these weapons to all the Bedouins in a circuit of fifteen days' journey. The trade by sea is carried on principally in ships belonging to people of Suakin and Jidda; they are almost entirely occupied in sailing between the two coasts. They are often manned by Bedouins, but more commonly by Somalies from the African coast between Abyssinia and Cape Guardafui, who are the best sailors in the Red Sea. The number of black slaves annually brought through Suakin to the coast of Arabia amounts, according to Burchhardt, to between 2000 and 3000, and about an equal number are sent there from Massaw in Abyssinia, where about 3500 are annually shipped to Moa. Many pilgrims, mostly negroes from Beled-el-Buand, who have been converted to the religion of Islam, are sent through Suakin in going to or returning from the holy cities of Arabia.

The inhabitants of Suakin, like those of all the harbours in the Red Sea, are a moitur race, but the majority of them are descendants of Hebrews, and a considerable number of the town of Shabber, the harbour of that country in the Indian Ocean; they are called Hadherebe. The other inhabitants are called Soukinsy, and consist of individuals of the Bedouin tribes of Hodenpolo, Amoror, the Baharein, and others of Arabian and Turkish origin. The Bithari language is generally spoken in El Geff, but the inhabitants of the town speak the Arabic as their native language, and with the Jidda pronunciation. The island contains a public school.

(Loth Valenti's, Voyages and Travels to India, Ceylon, the Red Sea, &c.; and Burchhardt's Travels in Nubia.)
SUA'ZÉ, FRANCIS, oldest son of Gaspar Suarez of Toledo, and of Antonia Vasquez of Utiel, was born at Granada, where his father practised as an advocate, on the 5th of January, 1548. After receiving a good elementary education, he was sent to Salamanca, where he studied law in 1562. The members of the Society of Jesuits, founded about 20 years before, were at this time labouring to extend the ramifications of their order with the full force of the enthusiasm which gave it birth. John Ramiez, as Suarez asserted in after years, was at that time a member of the Society, and had put himself under the guidance of Suarez, with the view of devoting themselves to a religious life by the favour of his preaching on Quadragesima Sunday in 1564. Suarez himself was among the number. He experienced consi- derable perplexity as to the form in which he could introduce himself to the order in order to admit him to probation; and even after John Suarez, the provincial-general, had resolved to receive him, on account of his possessing qualifications which appeared capable of being turned to account, remonstrances were offered against this determination by no less than two mem- bers of the Society. During the period of his noviciate Suarez eminently distinguished himself by that obedience and humility, and disregard of self, which it was one of the great objects of the founders of the order to impress upon their Society; at the same time, he made up his mind that he would submit to the severest course of study and of life, and make himself to the young man showed this submission to be the consequence not of a weak or timid disposition, but of a powerful spirit of enthusiasm enforcing self-abasement. But the probation- ary years were completed, he was made to begin his philosophy, the discipline of the ancient wisdom, under Parmanus, a man, though not the most severe, with an impassioned temper at first excited in him nothing but senti- ments of weariness and disgust; he made little progress, and earnestly begged of his superiors to allow him to de- part from it, which his request was granted, and he had the capacity. A more favourable opinion of his talents con- tinued notwithstanding to gain ground among the order, and Martin Gutierrez, then in high estimation among his brethren, was wont to say, pointing to Suarez, "God intends, through the instrumentality of this brother, to magnify the church, and do honour to the Society." Deferring in this, as in everything, to the directions of his superiors, Suarez toled through the usual course of philosophical study, but apparently with indifferent success; yet for advanced to the theological class, in which he continued to make but little progress, he found his progress obstructed by his deficiency in the preparatory branches of instruction. With the powerful im- pressed will which enabled him to wrest, as it were, by his perrinacity, from the reluctant fraternity admission into their college, he now laboured to make up the defect of his youth.

With this view he compiled for himself a system of metaphysics, the same which, published at a later period, with a very few finishing touches, elicited much applause. Having composed it with the utmost care and devotion at his private hours to self-tuition in the science of casuistry. Having taken his vows at the usual time, Suarez was immediately employed in the educational department. He taught philo- sophy for a short time at Segovia, and next theology, for several years, at Seville. In 1575, he was appointed to the pastoral charge of the Province of Aragon, and lectured on theology there, in the College of the Society, with great applause for eight years. The climate of Rome affecting his health, he obtained leave to return to his native country in 1581, where he was appointed pro- fessor of theology in the University of Alcala, a situation which he held till 1596. On quitting Alcala he lecturer for a year at Salamanca. The University of Coimbra in Portugal had, in the meantime, by repeated and urgent solicitation of his father, Philip II., appointed its principal professor of divinity. On his way thither Suarez received the degree of doctor in theology from the University of Evora. He arrived at Coimbra in 1597, and spent there the remaining twenty years of his life. His labours were unremitted, exacting more, even from memory, and forbad eloquence, rendered his lectures enormously popular. But the manner in which his contemporaries speak of him is calculated to leave an impression that his striking per- sonal character had quite as great an influence in raising him to eminence as that of his father, though far from this, rather than sought applause; he was indefatigable in his endeavours to render himself serviceable to others; he was guarded in his language, even when expressing himself with a vehemence which he was wont to manifest, both in regard to meat and drink; and the same enthusiasm which made him 'to take the order by storm,' continued to show itself unabated to the last, in his eager discharge of devotional offices. Of all his works, that which excited most atten- tion in this country was, as might have been expected, the controversial treatise called forth by the defence of the oath of fidelity published by James I., 'Defenso Fidei Cathol- icae, adversus afferentes Anglicanam, et errores et' Responsio ad Apologia pro Juramento Fidelissitatis et Praetationem Monitorium Serenissimi Jacobi, Angli Regii.' It appeared at Coimbra in 1613. It is the work of an enthusiastic recluse, who, deeply convinced of the truth of his opinions, and only anxious to prevent the propagation of his opinions to youth, not to attempt to practise them amid the hindrances of real life, pursues them out to all their conse- quences with a bold and severe logic. The language is decorous, the arguments cogent and irresistible; and he ends with the following words: 'The king, replied, not by publishing a rejoin- der, but by having the book condemned to be burned at London. By order of the Parliament of Paris, it suffered the same fate in that capital in 1614. It was not such a work as political leaders in the court of Rome would have ventured to put forth; but it was such a one as they re- ceived with the highest delight. As the world saw that they could apologise to sovereigns as well-meaning men, but ignorant of the world, and therefore not worth minding, at the same time that they reckoned, and not without cause, upon the good effects to be produced on public opinion by the single authority of an able and erudite writer. The Romanish politicians were in this perhaps no more insincere than secular politicians. With Suarez however it was perfect earnestness and conscientious conviction. When in- structed by his books, he expressed the enthusiastic wish that his body had enjoyed the privilege of bearing testimony to his faith by suffering the same fate; and he was in truth the stuff of which martyrs are made. His systematic works were after his death col- lected and published, and his opinions formed the subject of twenty-four volumes. The most important are: four vol- umes on the chief end of man, in which he treats of the will, good and evil, virtue and vice, and sins; a volume on laws, and God viewed in his capacity of legislator; four vol- umes on grace, viz. on justification and the means of grace, on actual grace and the means of grace, on habitual grace and its effects, on the true meaning of efficacious means of grace, &c.; two volumes of metaphysics, and one of commentaries on different works of Aristotle. The chief interest of his writings is that they are the product of his meditations. His system is a modification of Molinism, with a view to obviate some of the objections urged against it by the strict adherents to the views of St. Augustin. The controversy between the Reformed and Church of Rome is that between the Arminians and Calvinists in the Reformed church, is parallel to the controversy between necessita- tians and those who maintain the freedom of human action. The scientific disputants appeal to human reason; the theo- logians appeal to the constitution of man; and, with another, into the will of the deity the former must decide by investigating natural phenomena and reasoning upon them; the latter, by critically investigat- ing the language in which the revelation to which they appeal is couched. The qualities of mind elicited in theological controversy are acuteness and logical neatness. These are to be found in Suarez, nor is there anything in his writings to warrant the opinion that he possessed higher philosophical attainments; at least if the labouring more than a mere logician and verbal critic; but his greatness consists in his elevation of sentiment, impassioned tempera- ment, and energetic will. Suarez died at Lisbon, whither he had gone to make arrangements for the publication of his volumes on Grace, on the 20th of December, 1617. He is reported to have said on his death-bed, 'I did not think it was so easy to die.' [Life prefixed to the edition of Suarez's Works, pub- lished at Venice in 1740; Bibliotheca Nova Scriptorum Hierosolimitani, p. 419. His vis BothoURROW-NUT. [C. YAROCAR.]

SUBAPLYSIA/CEA. M. de Blainville's name for the first family of his Monopoleurobranchia, an order which he defines as having branchial organs of respiration situated in the side of the body. The shell is round, and covered by a part of the operculum mantle, in which a small, which is flat, or more or less involved with a very large
and constantly entire opening, is often developed; the tentacles null, rudimentary or auriculiform.

The following is M. de Blainville's definition of the family character of the Subaplysiidae:—

Tentacular appendages to the head. Orifices of the organs of generation but little or not at all distant from each other, and without an intermediate external groove.

The genera comprised under this family are BERTHELLIA, PLEUROBRANCHUS and NEUROBRANCHIID. [SEMIPHYLLIDANS.]

The other families of this order are—2, Aplysiacea; 3, Patellacea; and 4, Akera.

The Aplysia are defined as having a body not divided, or a single sinuous mass; four tentacular appendages, which are constantly very distinct, flattened, and suriform; mouth in the form of a vertical slit, with two lateral subcircular labial plates, and a cordiform tongue rough with denticles; eyes sessile, between the two pairs of tentacles; branchiae covered with a sort of operculum; orifices of the generative apparatus more or less distant, and united together by an external furrow.

Shell null or incomplete, constantly internal.

The genera in this family are, according to M. de Blainville—Aplysia, Dolabella, Bursatella, Natursus, and Eliaze.

The third family, Patellacea, consists of the genera Umbrella, Siphonaria, and Typhodina. The two first of these are treated of in the article SEMIPHYLLIDAE.

The fourth family, Akera, comprises the genera Bulla [BULLA], Bellerophon, Bullea, Lobaria, Sormetus, Gastroplora [BULLA], and Atlas.

SUBCONTRARY. This word is applied particularly to the sections of a cone, in a manner which, without interfering with that use, would allow of its definition being generalised as follows:—When a figure or solid is symmetrical, so that equal lines or polygons can be drawn on two different sides, those equal lines or polygons may be called subcontrary. Thus in Euclid, i. 5, the equal lines, which are obliquely deflected from the two ends of the base of the isosceles triangle, are subcontrary. In a right cone every section has its subcontrary, except only the circle which generates the cone, and its parallels. Let V be the vertex of an oblique circular cone, and ABCD the circle on which it is described. Let the plane VAC be that which passes through the centre of the circle perpendicularly to its plane. Then the cone is exactly the same on one side of the plane VAC as on the other; and if a plane AGF be drawn through A perpendicular to the line which bisects the angle AVF, the section AGF is such that either half would take the place of the other, if it were to make a half revolution about AF. It is then an ellipse, of which AF is one of the principal axes; and the middle point of AF, falling in the line which bisects AVF, is the centre. Consequently every section of this cone has a subcontrary section, except only those which are parallel to AGF. Hence the generating circle ABCD has a subcontrary circle BEFD, made by taking the line EF subcontrary to AC, and drawing through EF a plane perpendicular to the plane AVF. The angles VEF and VCA are equal, as also VAC and VFE.

SUBDUPLICATE, SUBTRIPlicate, &c. [Ratto, p. 303.]

SUBERIC ACID, an artificial substance produced by treating rapsed cork with diluted nitric acid; the cork is slowly dissolved, and a fatty substance is formed, which floats on the surface of the fluid. The solution is slowly evaporated till it thickens, and the residue is treated with about eight times its weight of water, by which an additional quantity of fatty matter separates.

When the solution is filtered, suberic and oxalic acids separate, the former in the state of a white powder; this is to be saturated with ammonia, and the latter, when it is precipitated and hydrolyzed by being decomposed by an acid, the suberic acid precipitates in the state of a white powder, which is to be washed with cold water. Suberic acid may also be obtained by treating margaric, oleic, or stearic acid with nitric acid. The properties of this substance are similar to those of the others; it is more soluble in boiling water, and the greater part of it is deposited from the solution on cooling in the form of a white powder; it is soluble also in anhydrous alcohol; fuses at about 300°; and sublimes in cubic crystals.

According to Laurent, it is composed of:

Seven equivalents of hydrogen 7 or 8.05
Eight equivalents of carbon 48.25...17
Four equivalents of oxygen 32.12.36...78

Equivalent. 87 100

The suberates are not an important class of salts; we shall therefore mention them briefly. Suberates of ammonium is soluble in water; the suberates of potash and soda are deliquescent, and fusible without decomposition; those of lime, barytes, strontia, magnesia, alumna, and manganes are more or less soluble: protosuberate of iron is a white precipitate; the persuberate is a brown one; the suberates of tin, zinc, mercury, and silver are white insoluble substances: that of cobalt is red, of copper blue-green, and uranium yellow.

SUBERN, a peculiar substance so named by Chevreul, as obtained from common cork, the epidermis of the quercus suber. When ten parts of cork have been treated with water, alcohol, ether, hydrochloric acid, potash, &c., there remain seven parts, which are suberin, possessing the following properties:—it is very inflammable; it yields water, a colourless oil, and afterwards a yellowish one, all of which are acid; then ammonium and a fatty crystallized substance are produced, and various gases are discharged, while charcoal equal to one-fourth of the suberin remains in the retort.

SUBJECT, SUBJECTIVE.—These words, with their correlatives Object and Objective, are now again restored to English philosophical language, through the medium of the German writers. The Subject is in philosophy invariably used to express the mind, soul, or personality of the thinker—the Ego. The Object is its correlative, and uniformly expresses anything or everything external to the mind; everything or anything distinct from it—the non-Ego. The universe itself, if considered as an unique existence, is an object to the thinker; and the very subject itself (the mind) can become an object, by being psychologically distinguished. The distinction is most important. The exact distinction between the terms subject and object was first made by the schoolmen; for by the Greeks the word dunasevtoi was equivocally employed to express either the object of knowledge (the materia circa quam), or the subject of existence (the materia in qua). This will be sufficiently illustrated, and correspond to the first most important distinction in philosophy, viz. the original antithesis of self and not-self. These terms, in their substantive and adjective forms, passed from the schools into the scientific language of Tieleius, Campa-
pella, Gassendi, Descartes, Spinoza, Leibnitz, Wolf, and others.

These terms however gradually lost their primary significance, and this owing to the ambiguous manner in which the terms were used. Besides its primary significance, object became metaphorically motive, and, final cause, &c. by a common change in all languages, of the metaphor into a real signification. Subject also became synonymous with object, and probably the logical terms ‘subject of predication’ facilitated this confusion. Be this as it may, the extreme want of precision with which the words are used, may be seen in the very common instance of calling anything ‘a subject of investigation’.

**SUBLIMATION**, a chemical operation effected by the application of heat to certain bodies; it is essentially similar to distillation in principle, but differs from it in the nature of the substances to which it is applied. In distillation liquids are converted into vapour, and condensed into the same form by the cooling agency of water; whereas in sublimation solid bodies are vaporized, and afterwards re-assume the solid state, in general merely by the cooling power of the air.

Sublimation is usually conducted in one vessel, the product being deposited in the upper part of it in a solid state, while the impurity remains in the lower. In small experimental researches a Florence flask answers perfectly well, and a large instrument of the description of that produced by heating iodine in it: a purple vapour rises, which almost immediately condenses in small brilliant dark-coloured crystals in the upper part of the flask, the impurity remaining in the lower.

Sublimation is extensively employed, and for two different purposes; the simplest case is that of using it for purifying a substance, camphor for example, in which the pure camphor is vaporized, and condenses in the upper part of the vessel, while the impurities remain in the lower part.

These substances are used down by sulphur and calomel, these substances are formed and sublimed by the same operation: in general large green-glass vessels, called *bolbeads*, are used for calomel and corrosive sublimate; while for camphor very small vessels are used, and these called *bolbeads* from the Italian *bondola*; in both cases a vessel is broken after each operation, to obtain the product. Among other substances procured by sublimation is benzoic acid, formerly called *flowers of benjamin*. This acid is sublimed in much larger vessels, and is usually made of glass, while the vapour of sulphur is condensed in a large chamber, or sulphur-house, and adheres to the walls in the form of a fine powder, and known by the name of *sublimed sulphur*, or *flowers of sulphur*.

(Geometry.) It may be worth while to state in a few words, and to prevent a reader of the older mathematicians from imagining that they spoke rashly, that the term *sublime geometry* was technical, meaning the higher parts of geometry, in which the infinitesimal calculus or some other empirical theory is employed.

**SUBLIMITY** has two significations: one, that of the quality or circumstance in objects, which raises the emotion named sublimity; the other, that of the emotion itself. In no modern philosophy, except the Scotch, could this distinction in language, for the sake of convenience, have been taken for an equivalent distinction in thought. Yet this distinction has been combated as an error, by almost all the Scotch writers—Kames, Stewart, Brown, Alison, Jeffrey, &c. They have found, with so much pretension, a term such as sublimity, which is defined by any correct thinker. The generality of people may concur beauty and sublimity to be qualities of objects without respect to their emotions, as they regard sound, taste, smell, &c. to be qualities of objects without respect to the senses; for the object of the mind is a certain conception, and the mind calls an objective tendency, that is, a tendency to believe in its own sensations and emotions as things distinct from themselves, but no philosophical thinker of the last century has ever fallen into this error, and when Dr. Thomas Brown was so much praised by so much pretension, that a sensation creates a sublime object, he was combating a chimera.

The Greeks named the sublime, that is, those conditions of objects which invariably excite in us certain emotions, to which we give the common name of sublimity, is a subject of great interest and importance in psychology, and has always been a favourite subject of speculation. We shall briefly notice the more celebrated theories which have pro- foiled to embrace and explain all those conditions which excite the emotions, and endeavour to point out their failures.

Longinus, whose work (Περί τῶν ἐν εἰδέναι συνεπειας) is the most antient, treats only of the sublime in writing. His treatise was meant as a supplement to the work of Ciccius on the *Sublime*, in which he says Ciccius brought a number of instances to show what is the sublime, as if every one did not know that well enough.

Burke’s ‘Inquiry into the Sublime and Beautiful’ was the first attempt to give philosophical precision to our notions of the beautiful and the sublime. His theory is, that the essence of the sublime consists in terror operating either openly or latently; and the delight which is caused by this terror is referred to those principles of human nature which he calls one of the passions of a general sort, and are not such as preserve us from danger. These passions ‘are simply painful when their causes immediately affect us; they are delightful when we have an idea of pain and danger, without being actually in such circumstances: this delight I have not called pleasure, because it is in no case pain and danger, but not so much from any idea of positive pleasure—whatever excites this delight I call sublime.’ (Inquiry, part i, sect. 18.) ‘Whatever therefore is terrible, with regard to sight, is sublime too, whether this cause of terror be in presence of greatness or of numbers. A split rock may be more terrible, and more sensibly so, than a mountain; yet the mountain may be more terrible, and more sensibly so, than a split rock; yet there is no terror in the emotion they excite. On the other hand there is a terror in a surgeon about to operate, or in a pedagogue about to flout—but no sublimity. The gallows is very terrible, but not at all sublime. Yet there is in it, or in a man about to die, a terror of its name, or of its general apprehension of the ruling principle of the sublime, as to write—There are many animals who, though far from being large, are yet capable of raising ideas of the sublime, because they are large, because they are angry, and because they are animals of all kinds.’ (Ibid, part ii, sect. 2.) Now, when a man asserts that a serpent is sublime, because it is terrible, it is evident that he uses the word sublime in a different sense from the rest of the world; otherwise we say a serpent is sublime, or that there is sublimity in the serpent, or that there is sublimity in the animal, or in the idea of the serpent, or in the idea of any other animal, or in the idea of any other creature.

The better to see how independent the sublime is of any danger manifest or implied, let us take a shower of rain and the stars. A shower of rain is certainly not sublime, yet there is danger implied in it, that is, catching your death or your cold. The stars are sublime, without a particle of danger in them, nor are sublimity, or sublimity, or any other name that is to denote or imply. Terror then is not the ruling principle of the sublime.

That the terrible is often a constituent of the sublime there can be no doubt, and Burke’s error consists in seizing upon this constituent, and giving it the name of the ruling principle. And further, we must observe, that whenever a feeling of terror is found to be a constituent of the sublime, there will also invariably be found another feeling of security, correcting this terror. Thus, when we stand beneath a rock, the terror consists in the natural apprehension of its falling down and crushing us, which apprehension is instantly checked by our feeling of security and confidence of its not falling. If this feeling of security did not exist, we should certainly be overcome by the terror. One terror is not therefore, and must not be, the ruling principle.

So universal is this accompaniment of a feeling of security correcting the feeling of danger in every case of sublimity wherein terror is a constituent, that we are as much at sea to account for that a feeling of danger, whether rising openly or latently, is the ruling principle of the sublime, as Burke was in his theory of terror. And we might define sublimity as the ‘effect of security.’ This sounds
ridiculous, but it contains a portion of the truth, and just
that portion of it which Burke's celebrated theory possesses.
If terror had been found to be an inviable element of the
sublime, the correct statement of the theory would have been
as follows. The sublime is the effect of the concealed or the
two feelings which produce it, and not the mere feeling of
horror; for, in fact, there are many cases in which no feeling of
can be found to exist. Infinity and eternity are sublime; but al-
thought, as he says, 'infinity has a tendency to fill the mind
with a sense of delight in horror.' Unfortunately, there is no
effect and true force of the sublime, yet it does not neces-
sarily fill the mind with horror; it may or may not, but in
either case it is sublime. Helvetius says, 'When God said,
"Let there be light, and there was light,' this image is sub-
liminal, for it should stand as an image inspire fear? Yes; be-
cause it is necessarily associated in our minds with the idea
of the Creator of such a prodigy; and being then seized in
an involuntary manner with a dread of the author of light,
we feel the sensation of a commencing terror.' (On Men,
vol. ii., p. 227.) Now we contend that although fear would
arise from such a train of thought, yet this train of thought is
by no means a necessary sequence to the image—God said,
"Let there be light, and there was light." It may or may
not arise in the mind, but the sublime produced by the
unconscious presence of certain ideas of our mind, exists in
the same manner as material, or that agree perhaps in no other cir-
stance, but in that analogous undefinable emotion which they
excite. We maintain, on the contrary, that sublime
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feeling, which preserves its characteristic throughout the
various shades of difference in the objects which excite it.
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sublime, or that feeling which we call sublime, is not the
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feeling may concur with it; that is to say, whether power,
terror, magnitude, or mental energy, together or separately,
each constitutes a part of the sublime; but, nevertheless there is always a
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ceeding that A was sometimes followed by I, o, pt, and II, as
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differ only in degree, whereas they differ in kind; and of
his notion of a 'progressive series,' whereby the ocean and
streamlet excite the same class of emotions.
Mr. Alison, in his 'Elements of Taste,' avoid the real question of sublime, and the same must be said of
his eloquent reviewer Francis Jeffrey, who sums up his
theory in these words: 'The emotions which we experience
from the contemplation of beauty are not produced by any passion or intrigue with which we contemplate; but by the recollection or concep-
tion of other objects which are associated in our imagina-
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objects of love, or of pity, or of fear or veneration, or some
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The first point in this passage is either a truism or an ab-
surdity. A truism, if it be meant to state that as a mere
sensation (without any respect to all the senti

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Burke's theory of the sublime, and that which
have a series of emotions which might at each moment be
similar to the preceding emotion; but which would become
at last so different from our earliest feelings, that we should
scarcely think of them as feelings of one class. (Ibid.)
The answer to that the sublime is a series of analogous recep-
tions, or analogical reproductions, you might trace the 'progressive series'
of feelings which the man underwent from his earliest
childhood; and when this series had conducted him to the
gallows, you might say that his feelings at that moment
were the truest of any he had ever felt, and that he
scarcely think of them as feelings of one class. Probably
not. Nor should we, in our ethical philosophy, class the
.crimes which brought him to the gallows, with the
influence which commenced the 'progressive series' of
his emotions.
The whole of Dr. Brown's lecture on this subject is
trivial or confused; and because he is unable to analyse
the feeling itself, he boldly pronounces it not to be analysed!
'It is the vain attempt to define what cannot be defined,
says, 'that has led to all the errors and supposed mys-
tery in the theory of subtλity. Sublimity is not one
emotion, but various emotions, that have a certain resem-
bance—the sublime in itself is nothing; or at least it is
only a mere name, indicative of the resemblance of cer-
tain kinds of our mind, extended to the different material
or mental, that agree perhaps in no other cir-
stance, but in that analogous undefinable emotion which they
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I. The material sublime. Examine every case of material
sublimity, and the most primitive fact will be found to be
vastness; whatever feelings may simultaneously concur,
this of vastness is invariable. Mere vastness is sublime.
Vastness either of form or of power. Hampstead Heath is
vast sublime, but Most Bois is. The Thames is not sub-
lime, but the ocean is. Yet to show how little terror has to
do with the emotion, we all know that there is as much
danger on the Thames as on the ocean when it is calm.

II. The moral sublime. It has been remarked that the sight of
a small fire produces no emotion, but that the boiling fur-
ness, theível storm, and the mighty earthquake are sub-
lime. Burke remarks that all general privations are
sublime because terrible, such as vacancy, darkness, solitude,
and silence. But they are sublime because vast, not because
terrible; for they are not necessarily terrible, and they are
necessarily vast, indefinitely.

These instances are sufficient to illustrate the principle.
It will be observed that there are some which seem more na-
aturally to derive their sublimity from terror than from
vastness, as Etna for example. But our object was to show
that vastness and terror are elements of sublimity which
emerge together, and that both are in some measure
essential to the sublime emotion. Burke asserts that these
emotions came into play; and as we have already seen in-
stances where terror does not form one constituent, and that
when it does form one, it is still accompanied by vastness,
therefore we possess the strongest proof of the more general
fact. Vastness is sublime as vastness; but terror is
sublime as terror. The difference between a shower and a storm
is purely quantitative, yet the storm alone is sublime.

III. The image sublime. As in considering objecti-
vively every case of material or moral sublimity, we found
vastness to be the principal constituent. In considering
subjectively every case of sublimity as an emotion, we shall
find the primary and invariable fact to be a sense of our
own insignificance; of our inferiority to the object, or to the
will which prompted the deed; and this sense of inferiority has
been indicated in the employment of a word expressing elevation for
sublimity. Mere vastness excites this emotion by exciting a corresponding sense of
our smallness. Mere vastness excites this emotion by ex-
acting a corresponding sense of our feebleness. Vary the
extent, and the image of vast, and the sense of
incompleteness of our theory, and a more extensive in-
duction will be necessary.

2. The moral sublime—or the sublime in human
affections and ideas. 3. The emotion of sublimity, which these
external things excite in us—or that feeling in the mind
which gives to certain phenomena of nature, or deeds of
man, the attribute of sublimity. Speaking objectively, the
emotion excited is one of insignificance; speaking sub-
jectively, the emotion excited is a sense of insignificance.

Previously undergone, and which that sensation would ne-
necessarily excite) an object in itself is not a sublime (a truism
however which Mr. Alison asserts to be the conclusion on
which his speculations rest: chap. v., sec. 6). An absurdity,
it if be meant to state that an object has no intrinsic quality
except what is derived from the imagination. The constancy of, for
instance, is the condition of its sublimity; so with the cata-
tract—make it a waterfall, and it ceases to be sublime, yet
this difference of size is surely an intrinsic quality in the
object which excites the emotion?

The principle of Mr. Alison's theory is 'that all objects are beautiful or sublime which signify or
suggest to us some simple emotion of love, pity, terror, or
any other social or selfish affection of our nature; and
that the beauty or sublimity of objects is conceded to
them, consistence either in the water they have acquired by association or otherwise
of reminding us of the proper objects of these
familiar affections.' (Ibid., and Alison's Essays, I.)

This theory is in the highest degree vague. It does not
discriminate what constitutes a sublime, it does not
analyse that complex emotion and draw forth its charac-
teristics, and moreover in its sweeping generalities includes
much that is false; all objects which excite terror are not
necessarily sublime; neither are all objects which
suggest some emotion to us of a character which are not, is, is
impossible on this theory. To acquire the emotion of sublimity
in association of ideas, is to say that this special emotion is
resolvable into the general law of the human mind, and
ract—that is, to say, that association of ideas is
independent of this special emotion altogether. It is saying that theft is a crime, and
referrable to the general law of criminality, without once
considering what constitutes theft as a crime, distinguishing
it from other crimes, such as murder, which involves
the descent of an apple, and association of ideas in
like manner is the law which regulates the operation of
memory and the flights of imagination; yet as memory
and imagination are distinct from the general law, as well as
from each other, so also is the emotion of sublimity distinct
from the emotion of hatred or beauty. Burke, Knight,
Kant and Price endeavoured to ascertain this distinction.
Brown overlooked it, and Alison evades it. Had the special
law of sublimity been found, and it was then attempted to be
viewed in connexion with the general law of the mind,
the efforts of Mr. Alison and Mr. Jeffrey would have been
of great importance; but in the meanwhile it was assumed.

It appears to us that the true method of attaining
the knowledge of this special law of emotion, is the method of
abstracting it from all other laws. Before attempting
to detect the law which regulates it, we must collect
all, or a vast number of instances of the sublime, and analysing
the elements of each case, endeavour to discover one
primary constituent, which is invariant in all the
emotion, and without which all the other constituents would
not be able to form that special emotion of sublimity.

In noticing the theories of former writers we have found
their inductive imperfect; they have selected too few in-
stances, and out of sublimity in vastness; the feeling others,
these theories were subverted by the mere statement
of them. It was sufficient to disprove the theory of terror, to
quote one instance wherein the terrible had no place, and
the same with the theory of mental energy. But these theo-
ries, though incomplete, contain much that is true in their
analyses.

In proposing a new theory, founded on a wider range of
induction, we may observe that if any one instance of the
universally acknowledged sublime can be shown in which
no one constituent (as to be the ruling princi-
ples) be detected, then that single instance is a proof of the
incompleteness of our theory, and a more extensive in-
duction will be necessary.

We do not advocate the sake of clearness to make use
of purely mental distinctions in treating this subject,
though they are liable to be misinterpreted as real
distinctions; accordingly we divide the question of the sublime
into three:—1. The material sublime—or the sublime
of nature. 2. The moral sublime—or the sublime in human
affections and ideas. 3. The emotion of sublimity, which
these external things excite in us—or that feeling in the mind
which gives to certain phenomena of nature, or deeds of
man, the attribute of sublimity. Speaking objectively, the
emotion excited is one of insignificance; speaking sub-
jectively, the emotion excited is a sense of insignificance.

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God diving—a sleeping lion. The grandeur of the lion arises from his known courage and power. He has an intensity of will, and of strength to execute that will, which is immensely to exceed his own. But a caged lion is no longer sublime. And why? Because he is conquered. Man has conquered and caged him. His boasted will and strength have not availed him against the power of man. Our feeling of inferiority has vanished in submersion. Man has subjugated Man, and Man has been a sleeping lion, they would have probably felt little emotion of sublimity.

When Mr. Knight says that the sublimity is the effect of man, and the effect of exciting a sympathetic energy in the mind of the spectator, he is really only saying that our mind is affected as a cause. Sympathetic energy often follows an emotion of sublimity, but not always. It does not follow the emotion of sublimity produced by infinity, eternity, night, or the emotion excited by the passage, 'God said, Let there be light, and there was light.' So far then from 'filling the reader with a glorying and sense of inward greatness,' as Longinus and Knight assert—it fills him with a sense of weakness and inferiority. We admit that any manifestation is desired, but when the spectator is not fitted for it, then it is a principle of human nature which does not come within the question of the sublime. But whether sympathetic energy follow the emotion of the sublime or not, it is never the cause of that emotion.

Mr. A. K. son, and Mr. Joffrey contend for the identity of the sublime, beautiful, and picturesque, led thereto by their resolving them into association of ideas, instead of distinguishing them as special emotions. We contend that each stands by itself, and that sublimity and beautiful, and distinct and dissimilar emotion. The beautiful is founded on emotions of the pleasurables, and its varieties as infinite of the varieties of objects which excite pleasurable emotions. The sublime is founded on an emotion of our insignificance, and of an act of imagination, and which excite the feeling of insignificance. The beautiful they rightly assert to be the principle of suggesting some past or possible emotion of some sentient being; but they are wrong in ascertaining the sublime to be the same principle. The sublime is, as we have said, prior to the beautiful, and is a pleasure derived from the manifestation of power is not the foundation of the emotion. The sublime and the beautiful are identified in the more general law of the association of ideas.

In conclusion we may thus sum up our theory. The invariable condition of sublimity in objects, either material or moral, is vastness or intensity. The invariable condition of the emotion of sublimity—that which distinguishes this emotion from every other emotion—is a comprehension of this vastness with a simultaneous feeling of our own comparative insignificance, together with a concomitant sense of present security from any danger which might result from this superior power. The antithesis to the emotion of sublimity is the emotion of contempt.

SUBMARINE DESCENT. Much ingenuity has been devoted from an early period to the contrivance of apparatus for enabling men to dive, or descend beneath the surface of water, to a greater depth, for a longer space of time, and with less exertion and less danger. This has been attempted by means of the air; but the various objects of the body. The fatal consequences of continued submersion have been described under ASPHYXIA [vol. ii., p. 490], and OSMOs [vol. ix., p. 157]; and from the facts there stated it is evident that about half a minute is the time during which most people can remain under water; without some provision for the supply of air for respiration. Experienced divers may remain under water much longer, though not without great and painful exertion; and which have been described as the experiments of a German engineer, who was able, by the use of extraordinary exceptions, to dwell without two minutes; a space of time too brief to allow the performance of any but the simplest operations beneath the surface of the water. The pearl-fishery affords the most prominent example of the employment of divers unassisted by apparatus for pro-

viding a supply of air. The mode of diving adopted, and the effects produced, described at length in this article, are described under PEARL FISHERY (vol. iii. p. 249). Professor Beckmann alludes to the employment of divers in ancient times to assist in raising anchors, in recovering goods from wrecks, or such as had been thrown overboard in times of danger, and the work of a great number of the enemy in time of war, as well as in fishing for pearls; but some of the statements quoted by him are evidently much exaggerated, as they speak of divers remaining for hours under water. Six minutes is about the longest time that any authority has allowed for the work of pearl fishers of modern times. [PEARL FISHERY]

Dr. Halley, in a paper printed in No. 349 of the Philosophical Transactions (vol. xxxii., p. 492), entitled 'The Art of Living under Water,' observes that the divers for sponges in the Archipelago of Tso, in the Arabian Sea, 'put into their mouths a piece of sponge soaked in oil, by which they were enabled to dive for a longer period than without it.' As the bulk of the sponge must diminish the quantity of air which the diver could inhale in his mouth, it does not appear probable that this practice could assist respiration. It has been more recently explained (Encyc. Brit., art. 'Diving') as a means for assisting the diver to see when under water. In still water light is transmitted freely to a great depth; but when the water is agitated it is dispersed and rendered almost useless. Much of this dispersed light is therefore reflected upon the surface of the water, and is there again reflected, and so on, perpetually, as if an optical system was constructed. To ensure a good light, which may enable the diver to find the objects of his search without delay, it is stated that he ejects a little oil from the sponge; and this oil rising to the surface, and spreading upon it, calms the waves in a remarkable manner, and occasions a brilliant light at the bottom.

In connection with diving by the unassisted powers of the body, allusion may be made to a curious and important fact related in the Encyclopædia Brittanica, on the authority of Professor Faraday, to whom it was communicated by a gentleman connected with the Asiatic Society. The lungs are, in their natural state, charged with a large quantity of impure air; this being a portion of the carbonic acid gas which is produced in the body, and of which the respiration, remains lodged in the involved passages of the pulmonary vessels. By breathing hard for a short time, as a person does after violent exercise, this impure air is expelled, and its place is supplied by pure atmospheric air, by which a person will be enabled to hold his breath much longer than without such precaution. The writer states that although he could only hold breath, after breathing in the ordinary way, for about three-quarters of a minute, and that with great difficulty, he felt no inconvenience, after making eight or ten deep respirations, with the mouth closed, and nostrils had been closed more than a minute and a half; and that he continued to hold breath to the end of the second minute. A knowledge of this fact may in many cases be of great importance, as it would enable a person to remain under water at least twice as long as he otherwise could do. It is suggested that possibly the exertion of swimming may have the effect of occasioning the lungs to be cleared; so that persons accustomed to diving may unconsciously avail themselves of this preparatory measure.

Another important fact, related in the same work, indicates the advantage of breathing condensed air, and thereby obtaining a larger supply of oxygen in the same bulk than with air of the ordinary pressure. After one of the disastrous occurrences at the works of the Thames Tunnel, Mr. Brunel, the engineer, descended in a diving-bell to examine the breach made by the irruption of the river into the tunnel. The bell descended to the mouth of the opening, thirty feet, at which the entrance of the bell was too narrow to allow it to go lower, in order that the shield and other works, which lay eight or ten feet deeper, might be examined from the bell. Brunel therefore took hold of the rope, and directed the bell to be raised. After he had remained under water about two minutes, his face became red, the bell alarmed, and gave a signal which occasioned Brunel to rise. On doing so he was surprised to find how much time had elapsed; and, on repeating the experiment of breathing, he was persuaded that breathing in the bell for only fully two minutes under water; a circumstance accounted for by the condensation of the air in the bell, from which his lungs were supplied by the pressure of a column of water nearly thirty feet high, which would condense the air into little more than one half of its usual bulk.
Many plans were suggested for enabling persons to remain for a longer period under water than is possible by the natural powers of the body, long before extensive use was made of any of them. The first that came under notice was that of Aristotle (problem xxxii, § 6), which has been supposed to intimate that in his time divers used a kind of kettle to enable them to continue longer under water; but this passage is variously rendered by different translators, and Beckmann apparently makes no reference to it. He states that the oldest information we have respecting the use of the diving-bell in Europe is that of John Taisnier, quoted by Gaspard Schott. It occurs in the 'Technics Curiosas, sive Mirabilia Artis,' of Schott, which was published at Nürnberg, in 1664, lib. vi. cap. iv. p. 393, and is taken from the 'Opusculum de Motu Celerissimo' of Taisnier, who says: 'Were the ignorant vulgar told that one could descend to the bottom of the Rhine, in the midst of the water, without wetting his clothes or any part of one's body, and even carry a lighted candle to the bottom of the water, they would consider it as altogether ridiculous and impossible. This however I saw done at Toledo in Spain, in the year 1535, before the emperor Charles V. and almost all the other spectators. The experiment was made by two Greeks, who, taking a very large kettle suspended by ropes with the mouth downwards, fixed beams and planks in the middle of its concavity, upon which they placed themselves, together with a candle. The kettle was equipped by means of pipes of any sort, and it was thus that the water, the water not any of its circumference should touch the water nearer than another, else the water might easily have overcome the air included in it, and have converted it into moist vapour. Schott calls this the 'cubus aquae' or 'aquaticus kettle,' but he also describes an apparatus called 'Lorica aquatica,' or 'aquatic armour,' which would enable those who were covered with it to walk under water, and which he seems to prefer to the 'cubus aquae' previously described. This apparatus was presented in plate 31 of Schott's work, which shows a man walking into the water with a covering like a small diving-bell over his head, descending nearly to his feet.

In England, without noticing the supposed contrivance of a Greek, or the Greek one, Dr. Bunner in 1548, states that a glass diving-bell was known at an early period. It is mentioned by Lord Bacon ('Novum Organum,' lib. ii., § 50; and 'Phaenomena Universi,' p. 702) as a machine used to assist persons labouring under water upon wrecks, by affording a reservoir of air into which they might resort whenever they required to take breath.

Some curious information on submarine operations is given in the postscript to a little volume published at Edinburgh, in 1688, by George Sinclair, 'sometime Professor of Philosophy and Astronomy at the University of Glasgow.' The postscript contains an account of how 'to buoy up a ship of any burden, from the ground of the seas,' and states that among those who had, in this nation, attempted to recover property from the sea, the late Lord Argyll, having obtained a patent from the king, of one of the Spanish Armada, which was sunk in the Isle of Mull, anno 1655, employed James Colquhoun, of Glasgow, a man of singular knowledge and skill in all mechanical arts and sciences. This man, he proceeds, 'not knowing the diving-bell, went down several times, the air from above being communicated to his lungs by a long pipe of leather. He only viewed and surveyed the ship, but I suppose buoyed myself up in the same manner. The next day, about the third, the late Lord Argyll employed an ingenious gentleman, the laird of Melgim, who went down with a diving-bell and got up three guns. A third and more successful trial was made, he says, several years after; and, still later, one of the vessels, supposed to be lost with the ship, that he would not admit a co-partner in the enterprise; which however came to nothing. Sinclair proposed to raise wrecks by the buoyancy of arks or boxes, open at the bottom, which were to be sunk full of water, and then filled with air either by sending down casks of air; by bellows and a long tube; or otherwise. He alludes to the occasional use of casks for the purpose of raising vessels, and explains why, when at a great depth, they are liable to be crushed by the pressure of the water, showing that, by allowing the water to enter by a hole in the lower part of the bell, it becomes an apparatus to produce an equilibrium of pressure, and thereby preserve it from rupture. About the time that the work above quoted was published, William Phips, who subsequently became governor of New England, attempted to raise a wreck from the bottom of the Spanish ship sunk on the coast of Han- niola. What was the precise character of his apparatus, we are not informed. His earliest experiments failed, but he was so confident of success, that he sought for assistance to enable him to proceed with his work. He at length presented the Marquis of St. Albans, the celebrated Monk, and in 1687, after many difficulties, he succeeded in raising a large quantity of treasure, with which he returned to England; where he was honoured with the hereditary title of Viscount. Most accounts state that he properly recovered an amount of 200,000l.; but in the 'Life of Sir William Phips,' published anonymously in 1697, but attributed to Increase Mather, it is stated as 300,000l.

It is unnecessary to cite further instances of the diving apparatus, or to notice other early authors who have mentioned the diving-bell, excepting to observe that Beckmann alludes to engravings in editions of Vegetius on the art of war, published in 1511 and 1532, representing a diver with a cap, from which rises a long leather pipe, terminating in a fish; and another which has the fish's tail in the water; and to a figure published in a work on fortifications, by Lorini, in 1607, which nearly resembles the modern diving-bell. Beckmann considers the insertion of the form as a proof that the person who drew them was not acquainted with the 'diving-apparatus,' but these wise have delineated. The machine described by Lorini consists of 'a square box round bound with iron, which is furnished with windows, and has a stuff affixed to it for the air.' In fact, this apparatus, though Italian, does not lay claim to the invention of this apparatus.

Dr. Halley, in the paper before alluded to, in No. 349 of the 'Philosophical Transactions,' describes the defects of the diving-bell, as previously used, and suggests a remedy for them. He states that although it does not enter into the early history of the machine to contradict the erroneous statements which have been made to the effect that Halley was the inventor of the diving-bell.

In its simplest form the diving-bell is a strong heavy vessel of wood or metal, made ready to descend under water, at the top and sides, but open at the bottom. If such a vessel be gradually lowered into the water, in a perfectly horizontal position, the air which it contains cannot escape, and therefore the vessel cannot become full of water. This may be readily proved. Suppose the vessel to be placed in an inverted position, into a vessel of water, and placing a bit of cork, or any other substance which will float on the surface of the water, under the glass. If a bit of burning matter be laid upon the cork-float, it will be seen that when the vessel continues to descend, the air which is enclosed below the water will be compressed, and contained in a smaller space by the pressure of the superincumbent water, when the glass is plunged to a considerable depth, than it will occupy under the ordinary pressure of the atmosphere. Where the diving-bell is used for descending to a very small depth, as in the operation before alluded to, the water will rise in the bell to a sufficient height to be inconvenient; but as the depth of thirty-three feet the pressure is so great as to compress the air into one-half its original volume, so that the bell will become half full of water; and at a greater depth the air will be still more compressed, and the water will rise proportionately higher in the bell. This condensation of the air does not materially interfere with respiration, provided the descent of the bell be very gradual, as the air in-
aminates itself into the cavities of the body and balances the pressure from without. The principal effect of the increased pressure is to press the lungs, occasioned by the circumstances that the Eustachian tube does not allow the condensed air immediately to find its way into the cavities of the ear, so that the pressure on the outside of the tympanum is, for a time, unbalanced by a corresponding pressure from within, and occasioned sensation like that of having quills forced into the ears. This continues until the pressure in the air of the mouth, which at first has a tendency to keep the aperture of the Eustachian tube closed, forces it open; an action which is accompanied by a noise like a slight explosion and an obnoxious utility for the decompression of ear cavities, and, by restoring the equilibrium of pressure on each side of the tympanum, removes the pain; which will return, and be remedied in the same manner, if the bell should descend to a deeper stage. But while the more condensation of the bell the bell holds in the water, the more it would refuse to be suspended by the air, it would slowly become so if no means were provided for renewing it from time to time, as it becomes vitiated by repeated respiration. The improvements in- volved at this level of the barrels, and that of the contracted space left free from water, when, being at a great depth, the air is compressed into a small volume, by affording a convenient means of supplying the bell with any required quantity of fresh air, would therefore be highly useful. The bell used by Dr. Halley was of wood, in the form of a truncated cone, five feet in diameter at the bottom, and three feet at the top, and containing about sixty cubic feet. This was coated with lead, and so weighted about the lower part as to prevent the water from entering, and there was a small aperture in its proper position: that is, with the large open end downwards, with its rim parallel with the horizon. In the top of the bell was a very strong glass window, and a cock, by opening which the foul air might be allowed to escape. Above the bell was a small diving-sail, and making the boat fall in a sort of a stage, so weighted that it might hang steadily. The whole apparatus was suspended from a sprit attached to the mast of a ship, and provided with tackle by which the bell might be raised or lowered, and the sprit might be slung round, for either carrying the bell full of the sea, or to suspend it clear of her side. The apparatus for conveying air to the diving-bell consisted of two barrels, holding thirty-six gallons each, weighted with lead to make them sink readily. Each of these had an open bung-hole in the lower end, to allow water to enter during their descent, so as to condense the air in the manner described when explaining the principles of the diving-bell itself. There was also a hole in the upper end of each, to which was fitted an air-tight stopper; a screw some considerable distance from the barrel, and having its loose end so weighted that it would fall naturally into that position. These air-barells were attached to tackle, by which, with the easy labour of two men, they might be made to rise and fall alternately, like a pump. When brought to the lower edge of the bell, they were so guided in their descent that the mouth of the hose always came directly to the hand of a man who stood upon the stage suspended from it. As the apertures of the hose were, during their descent, always below the level of the barrels, no air could escape from them; but when they were turned up by the attendant, so as to be above the level of the water in the barrels, the air rushed out with great force into the bell, the barrels becoming at the same time less and less necessaries, and, as the air-barells in rapid succession, the air in the barrel was kept in so pure a state that five persons remained in the bell, at a depth of nine or ten fathoms, for more than an hour and a half at a time, without injurious consequences; and Halley states, that besides, the bell was so fitted, for anything that appeared to the contrary. In addition to this, by the copious supply of air admitted during the descent, the bell was kept constantly full of air, and the water was prevented from entering to any inconvenient extent. Halley observed, that when the bell was let down gradually at first, and to a pause at the depth of about twelve feet, to drive out, by the admission of a supply of air, the water which had entered the bell. When the diving-bell was arrived at the required depth, he let out, by the admission of a little air, sufficient, equal to the quantity of fresh air admitted from the barrels. This foul air rushed up from the valve with such force as to cover the surface of the sea with a white foam. So perfect was the action of this apparatus, that Halley says he could, by removing the hanging stage, lay the bottom of the sea so far dry, with the result of the bell, as not to be the shoes thereon. When the sea was clear, and especially when the sun shone, sufficient light was transmitted to allow a person in the bell to write or read; and when the sea was troubled and thick, which occasioned the bell to be as dark as night, a candle was burnt in it. Halley sometimes sent up orders with the empty air-barells, writing them with an iron pen on plates of lead. Having, by these ingenious contrivances, removed the principal difficulties attending the use of the diving-bell, Halley foresaw its extension to the most capricious of maritime regions. This action applicable to various uses, such as fishing for pearls, diving for coral, sponges, and the like, in far greater depths than has hitherto been thought possible. Also for the viewing and pluming of the foundations of molese, bridges, &c. upon rocky bottoms, was an important advantage. Halley's date of this paper (1717), been applied with great advantage.

In 1732 a communication was made to the 'Philosophical Transactions,' No. 444, vol. xxxix., p. 577, by Martin Triwald, 'Captain of Mechanics, and military architect to his majesty Sweden,' and 'inventor of an improved diving-bell.' He had the sole privilege of diving upon the coasts of the Baltic belonging to the king of Sweden; and he expresses his opinion, founded on much experience, that no apparatus but that on the principle of the 'campaña urinaria,' or diving-bell, could be admitted as a secure mode of proceeding. His letter mentions a man, then sixty-three years old, who had followed the business of diving with the common diving-bell ever since he was twenty. Triwold's diving-bell was of copper, tinned inside, smaller than that of Dr. Halley's, and with a cover which could be raised or lowered. The man stood upon it suspended at such a depth below it, that the man's head would be but little above the level of the water, where the air is cooler and finer for respiration than in the upper part of the bell; and a spiral tube was attached to the dividing-barrel, and passed through a flexible tube and mouth-piece at the top, so that, when the diver was up in the bell, he might inhale cool air from the lower part, exhaling the foul air by his nostrils. Dr. Halley's air-barells are suspended below the bell, this construction. In lieu of windows of flat glass, Triwold uses convex lenses to admit light to the bell. In 1775 Mr. Spalding, of Edinburgh (who, according to the 'Annual Register,' vol. xix., p. 292, was a grocer), having ascended in one of Mr. Fern's Island, was induced to make some experiments with Dr. Halley's diving-bell, with a view to recovering property from wrecks, and was thereby led to the invention of means for rendering it more safe and manageable. For these inventions he received a grant of £ 500, and a subscription from the Society for the Encouragement of Arts, Manufactures, and Commerce, in the first volume of whose 'Transactions' (pp. 220-238) they are fully described. Mr. Spalding's communication contains also a very interesting account of his experiments with Halley's diving-bell. The improved diving-bell contrived by Mr. Spalding was made so light, that, with the divers and the weights attached to the rim, it would not sink; the weight necessary to counteract the buoyancy of the bell, and to keep it in a horizontal position. This was so mounted on pulleys that the divers could either draw the balance-weight up to the mouth of the bell or allow it to fall to a considerable depth below it. Thus, by letting up, the bell might be raised to the surface, and by letting down, it might be lowered to the bottom, or left stationary. Another improvement consisted in the addition of a horizontal partition near the top of the bell, which divided off a chamber that might, by suitable openings and valves, be filled either with water, or with air from the lower part of the bell; so as might be necessary for the convenience of the machine, and thereby to cause it to ascend or descend at pleasure. The bell was supplied with air by an apparatus resembling that of Halley; and ropes, stretched across
the bell, were used instead of seats and platforms for stand-
ing on. By these arrangements the persons in the diving-
bell were sheltered, in case of accident, from the surface
without any assistance from above; and it was
rendered so perfectly manageable, that it might be removed
to a considerable distance from the point at which it de-
scended; its outward motion, and its return to the vessel
for the purpose of being built up, being assured by a long
boat, which carried the signal-lines and the tackle for
working the air-barrels.

Though not in chronological order, it may be well here
to allude in an interesting manner upon the
article by Mr. John Farey, junior, and described by him in the
Diving-Bell,' in Brewster's Edinburgh Ency-
 clopedia. He proposes to make the upper chamber of the
diving-bell very strong and air-tight, without any openings
for these signals are given, in order. In the partition are fixed two
forcing-pumps, by which a portion of air should be forced
into the upper chamber, whenever, during a pause in the
descent, the lower chamber, or the cavity of the bell, is
replenished with air. By this means the upper chamber is
made a reservoir of air, from which the bell may be
replenished with air when it is desired to increase its
buoyancy by forcing out the water from the lower part.

In like manner, the buoyancy of the bell can be at any time
diminished by pumping some of the air from it into the
upper chamber, whereby the water is expelled, and the bell
raised to a greater height; and, as this is effected without wasting
the air, there is no danger of diminishing the buoyancy of the
machine to a degree which would prevent it from rising,
-imposing a weight upon the air or that necessary to lift it
perfectly.

Farey recommends the form of the frustrum of an elliptic
cone, for diving-bells intended for descending to wrecks;
the dimensions being, for a bell to hold two persons, six
feet by four at the base, three feet six inches by two feet
six inches at the top, and five feet high. He says
it suggests the use of a pressure-gauge in the bell, to show the
divers what depth they have descended to; and of a compass
to enable them to ascertain and give proper signals
respecting the direction in which the bell should be moved.
The bottom of the bell, being attached by separate
rope, by means of Attachment, is marked in the same manner as a deep-sea lead-line [Sourc-
ings, vol. xxii, p. 269], so that, after giving a signal to
raise or lower the bell, the diver may, by hauling in a certain
quantity of the signal-line, intimate the height to which
the bell should be moved. As far as the bell descends, it
be attached by ropes to the bell, so that, in case of falling,
they may not sink; and that, in case of being obliged to
leave a wreck to which it is intended again to dive, the
bell should be left at the bottom, with a buoy attached to it,
by means of a rope, and its position marked by a certain
point for descending may be found without difficulty.

The credit of having been the first to apply the diving-
bell in mid of civil engineering operations is usually attri-
buted to Smeaton, who used it in the rebuilding of
the foundations of Hexham Bridge. The report in which he
recommended its adoption is a very interesting document,
as it affords a familiar explanation of the principle of the
diving-bell. It is dated September 16, 1775; and is printed in the

The bell used on this occasion was an oblong box of wood,
four feet high, two wide, and three and a half long; and it
was supplied with air by a pump fixed on the top. The
river being shallow, the bell was not covered with water;
but the bottom of the bell was used in part of the
important work, Ramsgate harbour, by the same engineer.

Being here used at a considerable depth, an apparatus was
employed for forcing in a supply of air through a flexible
pipe, by means of a forcing-pump in a boat. The bell used in
this work was of the kind by which it was
employed at Hexham, but four feet and a half high, four and
a half long, and three wide. Its weight was fifty ewt., and
the thickness was so adjusted that it would, without the
help, sink in the proper position. In
under water by this machine, the sur-
bottom of the bell formed a convenient
work to; and in this, as well as in
ion of building, every necessary mo-
bell by the tackle by which it was
being made from below by striking
sions above the side of the bell with
meation the diving-bell has been fre-
quentiy, and with great advantage, employed in submarine
works; sometimes in situations in which it would have been
impossible to effect the required operations by any other means. The diving-bells
used in such works are usually formed on the model of that
made for the works at Ramsgate harbour; but the mode of
operation differs in accordance with the nature of the bell
may be suspended over the side or end of a vessel; through
an opening in the centre of a barge; from frame-work rest-
ing upon two barges, placed parallel with each other, but
at such a distance apart as to allow the bell to descend
between them; or even upon large pontoons, or large barrels.
In operations at the harbour of Howth, near Dublin, the
late Mr. Rennie used a diving-bell suspended from a kind
of railway scaffolding like that described under Scaffold-
ing [vol. xx., p. 497], as used in erecting large stone build-
ings; two barges being used upon the opposite banks, and
the lower, the stones, and the other to manage the bell. By
the apparatus described as above, aided by ropes attached to the
stones, and managed by the men in the bell, the submarine
masonry could be executed with great facility. Of the use
of this important machine in recovering property from
wrecks, the operations upon that of the Royal George afford
a familiar example. According to the "Annual Register,"
vol. lx., p. 42, this wreck was first surveyed by the diving-
bell on the 24th May, 1817. Smeaton's method of supply-
ing air to the bell was water, which he remodelled; but
that of Halley may, in some cases, have the advantage.

In whatever way a diving-bell may be mounted, it is
essential that it should descend very gradually, and that its
design should be in such a manner that it may be easily
brought to the surface when accident happens. We hear
of Richard Jones, who had been placed in a very perilous
situation by the failure of the crabs by which a diving-bell
in which he was descending was being lowered, was
rewarded by the Society of Arts for a contrivance to pre
vent the generation of so dangerous a turn. The
spider can have a brake, regulated by the centrifugal motion of two
balls, like the governor of a steam-engine; so that, while the
spider revolves slowly, and therefore allows the bell to
descend gradually, the brake may not be called into action;
but if it is necessary to raise it, the weight of the balls is
so much less than the weight of the bell, so as to run down with
dangerous velocity, the separation of the balls should disengage the
brake, and thereby stop the motion of the spider. The machine is
described and represented in detail in vol. lii., p. 72, &c. of
the Society's Transactions.

Blasting is often required in submarine operations, and is
commonly performed by joining lengths of tin tube together,
until they reach from the charge of powder to a little above
the surface of the water. These lengths of pipe are joined
upon the outside of the bell by a cement, to render it
water-tight, and as the joining is effected, the bell gradually
rises, so that the top of the pipe is always under it, until it
reaches the surface, to prevent water from getting in. When
the bell is suspended as before by a person or a piece of
a small iron rod or a long piece of red-hot iron down the
bell, and thus fires the charge. The recently-invented plan of blasting by electro-
magnetism is far simpler and more certain than the above.

Many plans have been proposed for enabling a man to
walk beneath the surface of water, or to dive in such
a manner as to assist in the raising of anchors, or the recovery
of property from wrecks, by means of waterproof coverings
for the head and upper part of the body, or of strong vessels
in which every part but the arms should be enclosed it
simple to enable the person to work without becoming
inconvenient, or of such a kind as to be compatible with the flexibility essential to the free use of the
limbs. Dr. Halley alludes, in his paper on the diving-bell,
to some contrivances of this kind; and in a subsequent
paper [Trans. No. 300, vol. xxx., p. 177] he de-
scribes an apparatus of his own invention which
might leave the diving-bell, and walk about the bottom of the sea; his head being covered by a heavy leaden cap
like a small diving-bell, supplied with air by a flexible tube
extending from the lower part. To this was fitted a
metal tube round his arm, and unwind it as he placed the bell, and
use it as a clue to direct him to the bell in returning.
This pipe was formed of leather soaked in oil and wax,
and was held open by a spiral coil of brass wire; its internal
...
The first diving-apparatus, which afforded great facilities for the manufacture of water-tight tubes for such a purpose. So long as the helmet was above the level of the water in the bell, it would be kept full of air; and in case of having to stop before the bell was sunk, the operator could at any time with only a stroke of the arm to which the bell was connected, turn the bell so as to be filled with air.

The front of the helmet was glazed; and the diver, who was clothed in a thick woolen dress, fitting close to the body, to diminish the resistance of the cold water; and the breath was enabled of course, by means of a weighted girdle and weighted cloaks. Aquatic armour, whether supplied with air from above, or carrying a store in its cavities, sufficient for last for to last for the time the diver intends to remain submerged, has been brought so little into use, that it is needless to describe the space required for a minute description. The apparatus of M. Klingert, which was first described in a pamphlet published at Breslau, in 1798, has been fully explained in Tillotson's *Philosophical Magazine* (vol. iii, pp. 59 and 171), and in many other works. Klingert himself died in 1839, and his last work of a technical character has been exhibited at the Polytechnic Institution, London. In the *Gentleman's Magazine* for September, 1799 (vol. xii, p. 412), will be found a notice of a curious diving-apparatus, consisting of a case enclosing the person, with air-tubes passing from the apparatus, which have been contrived and used for many years by a person named John Lethbridge, who writes from Newton Abbott, near Exon. Devon, and states that he tried experiments both in air and water with this and similar apparatus, and that he has been able to stay down the lake, in deep water, with perfect buoyancy, for thirty minutes at a time in a frame made of flexible pipes. A similar machine was contrived by Mr. Rowe, in 1753, which was to be lowered by tackle like a diving-bell.

One of the diving-machines contrived by Klingert was so constructed that it would rise or fall by the motion of a piston in a cylinder, in the lower part of the apparatus, by which the diver could vary the density of the air, and consequently the specific gravity of the machine, at pleasure. A very simple apparatus for enabling a person diving without any apparatus to rise to the surface, or to the same object, has been recently invented by Mr. W. H. Thorntwhate of Hoxton. It is described in the fifty-second volume (p. 243) of the *Transactions* of the Society of Arts, by whom Mr. Thorntwath was rewarded for it in 1829, and consists of a cylinder, attached to which is a small but strong copper vessel. Into this vessel air is to be forced by a condensing-syringe, until it has a pressure of thirty or forty atmospheres. The bell is then put on, in a collapsed state, so that it affords no boisterous; and the operator begins to exhale the air at the breast, but when he desires to rise, he opens a valve, by which the condensed air escapes from the copper vessel into the bell. As it expands the bell, it affords sufficient buoyancy to raise the diver upwards; and it enables him to rise to the surface of the water.

An account of schemes for submarine descent would hardly be complete without some allusion to projects for submarine navigation, of which many have been suggested. An early instance is that of Cornelius Drebbel, or Drebelle, who is said to have made a vessel to be rowed under water, which was tried in the Thames by order of James I., and carried twelve rowers, besides passengers. This vessel is alluded to by Robert Boyle, in his *New Experiments Physico-Mechanical, touching the Spring of the Air, and its effects,* &c. (1662). In 1666, a curious work contain an account of Drebelle's experiment, and state that he accounted his chief secret to be 'the composition of a liquid that would speedily restore to the troubled air such a proportion of vital parts as would make it again effervescent.' This was an idea that recurred in many of the schemes of this kind for enabling the same air to be used again and again, was never made public. Bishop Wilkins, who also favoured some other whimsical projects, devoted a whole chapter of his *Mathematical Magic,* which was published in 1648, to a dissertation 'Concerning the possibility of framing an Ark for Submarine Navigation.' In this work (book ii, chap. 5) he recites the difficulties of the scheme; but evidently considers them not insurmountable; and afterwards he enlarges upon its advantages, in particular security from pirates, storms, ice, &c., in naval warfare, philosophical experiments, discoveries, &c., and at length states that 'All kind of arts and manufactures may be exercised in this vessel. The observations made by it, may bee both written and (if need be) printed here as likewise. Several Colonies may thus inhabit, having their children born and bred up without the knowledge of land, who could not chuse but be amazed with strange conceits upon the discovery of this upper world.' The bishop adds, 'I am not able to judge what other advantages there may have been suggested, nor can I fully answer to these notions all conjectures.' In 1774 a Mr. Daws, on a sailing voyage, lost his life in an experimental descent in Plymound Sound, with a vessel of about fifty tons burden, which he thought he could have caused to rise after a lapse of several hours, which was to be accomplished, as stated in the seventeenth volume of the *Annual Register* (p. 245), led to the publication, in the following year, of a 'Philosophical Dissertation on the Diving Vessel projected by Mr. Day, and sunk in Plymouth Sound,' by N. D. Falcu, M.D., which contains a representation and minute description of the vessel, an account of the ineffectual attempts to raise her, and much other curious matter. One of the most successful machines contrived for submarine navigation was that of Mr. Bushnell of Connecticut, which was proposed in the *Transactions of the American Philosophical Society,* vol. viii, p. 201, and which has been copied into *Nicholson's Journal,* vol. iv, p. 329. The more recent projects of Fulton for the same purpose have been referred to in a previous volume. *Fulton, Rohrer,* p. 123.) In 1839, a plan was published in the *Encyclopedia Metropolitana,* written by Mr. Balloch, a glass and rubber plan is laid down for the construction of a vessel for submarine navigation. Among the suggestions there made are those of using oxygen, condensed in store-vessels, to be used for dissolving the air, and by the exhaustion of the air, the chief object appears to have been the introduction of submarine warfare. His vessel, which was propelled by screws, somewhat resembling those recently tried for steam-vessels, is described in the *Transactions of the American Philosophical Society,* vol. viii, p. 201.

**SUBMARINE FORESTS.** Under this term geologists class very numerous accumulations of vegetable matter, involving branches, trunks, whole trees, or fruits of trees, rarely in the attitude of growth, sometimes in the condition of having fallen, and locally with the appearance of having been drifted from some distance, but all occurring on the margin of the sea, below the level of high-water, and usually extending not unfrequently much beyond the low-water line.

**Subterranean Forests** is another term for similar phenomena, not limited however to any particular level, nor to those in close proximity with the sea. The circumstances as to level, and proximity to the coast, are the most marked when these buried forests either grew on or were drifted to their present repositories, and the changes in these respects which may have since occurred, are extremely worthy of consideration.

If we take, as a mode of classifying these phenomena, the relative levels of the buried forests and the surface of the sea, we find a series of instances, beginning on high ground, and ending below the sea. On parts of the very high ground at the head of Glencoe, we see yet rooted in peaty soil the bases of enormous trunks of trees, while far around, and even in much lower levels, and warmer and more sheltered situations, large trees are altogether wanting. On the moderate elevations between Kirby Bank and Windermere, small trunks of trees, and branches of trees, are found, which are cut off from the main masses, and lie in the shallow lakes, in which portions of trees abound; on the course of many rivers, in flat parts of valleys, and especially when they approach the sea, as at Ferrybridge on the Aire, and at Stockton on the Tees, vegetable accumulations, peaty warts, and branches of trees, are found, which are left in place when the trees abound. In situations where the tides cease to have power, along the sides of rivers, the accumulations of this nature are locally enormous, as over the large area of Hatfield Chase and Thorn Waste, in Yorkshire, Sedgemoor in Somersetshire, and the fens of Holland in Flanders. Finally, on reaching the actual sea-shore, whether along the course of a great river, as the Humber or the Mersey, or on the bare coast, as in Lincolnshire, Yorkshire, Norfolk, and many parts of the coast of Great Britain, we find narrow or extensive deposits of like nature, both above the water and below low-water mark. Generally in the

situations, the trees, even though not now growing in the
neighbourhood, are of sorts that belong to the same lati-
itude and the same region. What might be the circum-
stances which encouraged their growth in antient times is
not easy to be determined. Instead of supposing any ele-
vation of land since the growth of trees in the high valleys
about Glencoe, which, by raising the surface to a tempera-
ture too low, prevented their continued existence, it ap-
pears better to suppose that the duration of forests under
some constant conditions is limited. It is only by mutual
protection in some cases that trees rise to perfection. Ar-
riving from this cause of at once its mortality, and pass-
ing on, the country to decay, it may easily happen that
limited area, that a whole forest of trees should perish and
be followed by no successors. Such an occurrence might be
accidentally caused by the alteration of the supply of water,
the generation, that, addition of sediments and other causes
of injury. Violent tempests might prostrate a forest, and
affect the drainage of the country, and thus convert the
area where the forest grew into a marsh, a peat-bog, a
buried forest.

In these cases of this nature have commonly been sugges-
ted by the phenomena observed in various parts of
Europe. De Luc adopts such views regarding the buried
pine-forest of Bornholm, which is covered by peat and sur-
rounding by sand-hills. The trees lie prostrated from the
circumference of the sand-hills, by the force of inund-
ations, but by the violence of winds. (Hist. de la Terre,
v. 222.) A similar opinion has been entertained concern-
ing some part of the extensive levels of Hatfield Chase
in Yorkshire, where in places the trees appear as if prostrated
in a similar manner, but without the aids of sediment.
Moreover, even during the existence of this
posits of this nature on the shores of the Frith of Tay, Dr.
Fleming found the clay below the peat penetrated by
num-
rous roots, which are either carbonized or pyritized.

But there are other cases in which the accumulations of
buried trees may be supposed to have been drifted. This appears to be the fact in the eastward pro-
longation of the great levels of Hatfield Chase along
the maturity of the Humber, and much below its level. De Luc regards the vege-
taion of this district as the result of peaty deposits of
Rotterdam, which rests on silt, as that rests on sand.
He regards the whole as drifted by the river currents, and
as accumulated below the river waters.

There are many examples of the occurrence in one de-
posit of sand, clay, peat, timber, lacustrine shells, and bones
of quadrupeds. It is rather characteristic of such combi-
inations that there is only one layer of peat with trees, that
it lies upon the clay, and that in this clay are the lacustrine
shells and the bones of quadrupeds. This general rule
appears to apply in the deposits of Yorkshire, the
shire and Lincolnshire, including bones of deer, and to the
larger area of the Irish peat, which yield the bones of the
gigantic elk; and is exemplified in the American deposits
which contain the mastodon. Beneath the whole of these
deposits is a deep bed of gravel, on which are usually
boulders of distant rocks, commonly called ’Diluvium.’
The shells are usually of existing species, the trees of exist-
ing kinds, but the quadrupeds (beaver and Irish elk for
instance) often of races locally or universally extinct.

It has been thought necessary in some cases to appeal to
a local change of the relative level of land and sea for an
explanation of the submerged forests of the English and
European coasts: sometimes this may be avoided by assum-
ing in ancient times a different condition of the tides; and
sometimes it is possible that the forest has been sup-
posed to have been transported. It should seldom be
granted, because, in the very same district, the ’diluvium’
with its marine shells may be thought to be a ’raised beach,’
forests to the near subsidence of the land. This is the case in Holderness.
The antiquity of these buried forests is often beyond the reach of inference, but in many inland districts the con-
dition of the trees is such as to have led observers to be
ceive they were cut down or burned down. In Hatfield
Chase (Phil. Trans., 1701) many of the trees were thus de-
sroyed; some were evidently worked by the woodman’s
stones of tool or stone. Roman coins were gathered from
among the roots; and in one situation the ground below
seemed to have been levelled in part a short distance
above.

Examples of accumulations such as have been
generalized, are abundant round all the shores of Britain,
and are common in the interior of the islands.

(De la Beche, Geological Manual, 3rd edition, p. 166; Lyell, Principles of Geology; Phillips, Treatise on
Chalcky, v. 1, part 1, p. 338; De la Pryme, in the Philosophical Transactions, abridged by
Hutton; Transactions of the Cornish Geog. Soc., c.c.,
may be consulted for details of phenomena and reasoning
on the causes and dates of their occurrence.)

SUBMULTIPL, an Autopoet Part.

SUBMYTLICA/CEA, M. de Blainville’s name for his
sixth family of Lamellibranchiata.
The following is his definition of the Submyticles:—
Mantle nearly as in the Mytilacea, that is to say, adherent,
and slit throughout its lower part, with a distinct orifice for
the anus and a commencement of a tube for respiration by
means of a particular disposition of its posterior extremity,
which is furnished with tentacular papillae; a large flabby
organinal mass for the submucous, without byssus at its base;
ii. distinct muscular impressions.

Shell free, subnaucrous, regular, equilvalve; dorsal hinge
lamellar, ligament external; two muscular impressions
with the palial impression which unites them not excavated
below.

M. de Blainville remarks that this family are more or
less inhabitants of mud, and are locomotive by means of their
foot.

He divides them into two sections:—
1. Limonecones (Limmnoderm, Poli).
All these have an epidermis, are nacreous, and are inhab-
ants of fresh waters. [Naiades.]

2. Species without any evident epidermis, not nacreous,
and more or less pectinated.
These are marine.

Under this section M. de Blainville arranges but one
genus, Cardita.

Lamarck used the genus Cardita in his family Car-
dae, between Cardium (Conchacea, vol. vii., p. 426) and
Cypricardia.
But M. Deshayes, in the last edition of the
Animaux sans Vertébres, well observes that this is not the
true position of Cardita, as far as its approximation to
the Cypricardia is concerned, and that therefore Cardita
should be placed in the Limonecones, a family of the
Mytilaceae, or fresh-water muscles. He remarks that
Lamarck seems to believe that certain Cardita have a byssus;
but he adds that certain individuals checked in their growth,
and so become irregular, have given rise to this opinion,
which seems founded on erroneous observations of the
foundation.

Generice Character.—Animal resembling that of the
fresh-water muscles. [Naiades.]

Shell very thick, solid, equilvalve, often very inequi-
lvalve; uniones recurved forwards; hinge with two un-
equal teeth, the inner one plain, the outer one incurved,
and as it were a toothed tongue. Cardinal, the other long
mussel, bent, and placed much more backwards; ligament
elongated, subexternal, and sunk into the shell; muscular
impressions rather large and very distinct; palial impres-
sion narrow.

M. de Blainville divides the genus into the following
sections:—
A. Elongated species, a little notched or gaping at the
inferior border; umbo nearly cophalic; ligament
hinged. (The Mytilicardia.)

Example, Cardita Ajar, of Adans., 'Sonnet,' pl. 15,
f. 2, and Cardita calyculata, 'Malaol,' pl. 69, fig. 1.
B. Oval species, with the inferior border nearly straight
or a little convex, crenulated and completely closed.
The Mytilicardia.

Example, Cardita Aja, of Adans., 'Sonnet,' pl. 16, f. 2.
C. Species nearly round or suborbicular, with the
inferior border rounded, denticulated, and more or
more equilvalve; the two teeth shorter and more
irregularly separated. (Genus Limnecon.)

Example, Venetocardia imbricata, 'Malaol,' pl. 68, f. 3.
D. Elongated and very inequilvalve species; the
umbo nearly cophalic and recurved forwards; two
short cardinal diverging teeth besides the lamellar
toothed one, the last one long and more or less project-
ing; abdominal impression sometimes a little directed
backwards. (Genus Cypricardia, Lam.)

M. Deshayes, in the last edition of Lamarck, observes
that the Crypticaria resemble the Cardita in their form; but that, nevertheless, on a careful examination, one may perceive that they have more relationship to the Cardita: it is thus, he adds, that some species of the last genus lose the anterior lateral tooth; and others, instead of having the cardinal teeth en croit, have them nearly equal and diverging, as in the Veneres. If, says M. Deshayes, we unite the two modifications of Cardita in a single shell, we have a Crypticaria of varying, but not radical, nature. In his band he may suppose that the animal of Crypticaria has, as in Cardita, a pair of siphons, situated at the interior and posteriorly, and pierced in the commissure with two unequal apertures.

With regard to Venericardia, M. Deshayes (loc. cit.) is of opinion that it will be necessary to change the relationship of that genus, placed by Lamarck among the Veneres, and even to suppress it altogether, for the purpose of removing the species ascribed to it in the genus Cardita. Many cogent reasons conducted M. Deshayes to this result. Poli, he remarks, has, in his great work, given figures of the animals of two species, one belonging to Cardita, the other to Venericardia. The resemblance of these animals in all essential characters proves satisfactorily that they appertain to the same genus, and this resemblance of the animals will be confirmed by that of the shells. We see, continues M. Deshayes, that Lamarck has comprised among his Cardita elongated, transverse, very inequilateral shells, having at the hinge one or two very oblique teeth in the direction of the upper border. Doubtless if all the Cardita were transverse, and the hinge presented some peculiar characters, it would be impossible to mistake them for transverse; even supposing the animals to be unknown, but this is not so, and Lamarck himself has arranged among the shells which have all the characters of Venericardia.

In uniting all the species, living or fossil, of the two genera, and placing them in their most natural positions, a passage between them will be observed so insensible, says M. Deshayes, that it will be impossible to point out where Venericardia finishes and Cardita commences. When all the characters are examined, the same resemblance is observable to the shells, and they may be placed in the same genus; for the reason that, whether the Cardita or Venericardia have longitudinal ribs, their shell is thick and solid, the lunule is small and much sunk, the hinge is more or less thick according to the species, and offers some modifications of small importance, according to the number of the ribs placed transversely, and greater or less number of longitudinal ribs; and the teeth are more or less oblique; and this obliquity is observable even in species which are entirely transverse; but in the greater number of those last the anterior tooth becomes very small and perpendicular to the first; these differences are established by the figures of shells passing from one species to the other. The pallial impression is always simple in its contour, and this important character is found in the Venericardia as well as in the Cardita. It is necessary, M. Deshayes remarks, to remember that in the Crypticaria the pallial impression is never simple; posteriorly is seen a triangular inflexion, which announces that all the animals of that family are provided with two siphons posteriorly: the Venericardia and Cardita have it not; the borders of the mantle are free throughout their extent, as in the Naucrates.

Up to this time naturalists have regarded as of great value the presence or absence of siphons, and the union or separation of the lobes of the mantle, and have advantageously employed these characters for the formation of families: if there is no siphon in the Crypticaria, we ought not to contain any animals excepting those furnished with siphons posteriorly, and it is certain that such should be the rule, it becomes evident that Venericardia should be transported elsewhere; and as we have seen that it becomes fused as it were with the Cardita, it ought to undergo the change of relationship necessary for that genus.

Habits of Crypticaria.—Crypticaria have been found on sands and reefs, but the depths do not appear to have been recorded.

Habits of Venericardia.—Venericardia has been found on mud and sands at depths varying from the surface to fifty fathoms.

Habits of Cardita.—Cardita has been taken on mud and sands, in sheltered bays. Depths varying from the surface to thirteen fathoms.

M. Deshayes, in his Tables, makes the number of living species of Venericardia and Cardita, which he joins together, twenty-five; and he records Cardita Sulcata, Ajur, Trapezia, Squamosa, crassa, and intermedius, as being found both living and fossil; of the only living species of Venericardia noticed is Ven. auranti, from the seas of New Holland; of Cardita twenty-one living species are recorded. To these must be added nine living species brought home from the coasts of Central America, principally, by Mr. Cuming, and described by Mr. G. B. Sowerby and Mr. Broderip respectively in the Proceedings of the Zoological Society of London, for 1832, and in Müller's Synopsis Testiaeorum.

Example, Cardita calyclata.

Description.—Shell oblong, white, painted with lunate brown spots; the ribs imbricate-squamous; the scales arched and incumbent.


cardita calyclata,
a, with the umbones turned towards the spectator, showing the lunule.

Fossil Subsytyleaca.

With regard to the fresh-water division, see the article Naucrates.

M. Deshayes, in his Tables, makes the number of fossil (tertiary) Venericardia and Cardita fifty; the species found both living and fossil (tertiary) are noticed above. In the last edition of Lamarck the number of fossil Venericardia amounts to ten, and of Cardita (fossil only) seven. Mr. Len describes and figures four new species from the tertiary of Alabama. (Contributions to Geology.)
expose the abdomen, which is provided with the rudiment of a foot often calcareous, with the rudiment of a bursa.

_Shell of a close texture, subammonial, always more or less arculate, with a subcomplicated hinge; a single subcentral muscular impression, without any trace of the palial ligament._

_Genera._—_Spondylus, Hinnells, Pecten, Pedum, Lima._

*[Pectinidae; Spondylidae.]*

SUBGENA. *[Witness.]*

SUBGENA. WRIT OF. *[Pleading In Equity; Royal Letters.]*

SUBSALT. *[Salts.]*

SUBSIDY. A quantity or symbol is so called when it is not essentially a part of a problem, but is introduced to help in the solution. The term is particularly applied to angles in trigonometry, and the trigonometrical tables give a great power of working with the sine, which takes a large power of working over their management, which causes their frequent introduction, even in problems in which there is no question of angular quantity. For example, suppose it required to calculate $a^2 + b^2 = (x^2)$, where $a = 29164$, $b = 3'0018$, $x = 11316$. Also $x = \frac{a}{r} = \frac{b}{r}$, which gives $r$ from the tables, and $\phi$ from the equations, and from

$$\tan \phi = \frac{b}{r} \quad \cos \phi = \frac{a}{r}$$

The quantity to be calculated is

$$r \cos \phi \cos \theta = \sin \phi \sin \theta, \quad r \cos (\phi - \theta)$$

and the final result is found from the tables in much less time than $a^2 + b^2 = (x^2)$ could be calculated by ordinary means. There is of course no rule for the most convenient introduction of subsidiary angles: every case must be treated as a separate matter.

SUBSIDY, from _suberum_, a Latin word signifying aid or assistance. _Subsidies_, says Lord Coke, _were antiently called auxilia, sides, granted by act of parliament upon need and necessity; as also for that originally and principally for the supply of the commonwealth, and the safe keeping of the seas._

The word used in its general sense was applied to aids of every description; these were of two kinds, one, perpetual, the other temporary.

These which were perpetual were the antient or grand customs, the new or petty customs, and the custom on broadcloth. The temporary included tonnage and poundage; a rate of four shillings in the pound on lands, and two shillings and eight pence on goods; and the fifteenth or tenths, &c. of moveable goods. The limited sense, which is also the more modern word, is a word subordinate, attaches only to the rates on lands and goods.

The grand customs were paid on the exportation of wool, sheepskin, and leather, at the rate of, for every sack of wool weighing thirty pounds or over, half a mark, or six shillings and eightpence; for every three hundred sheepskins, half a mark; for a half of a leather, a mark, or thirteen shillings and fourpence. The petty customs were payable by merchant strangers only, and consisted of an excess of one half over and above the grand customs payable by native merchants. The custom on broadcloth was first given to the king in the 21st year of Edw. III., to indemnify him for the loss he incurred in consequence of the practice, then beginning to prevail, of making up the wool into cloth in this country previous to its exportation. The cause of the demand on broadcloth was fixed in the 27 Edw. III., for every whole piece of cloth not ingrated, at fourpence; ingrated, at fivepence; if dyed scarlet, at sixpence. In addition to this was the almsman's fee, payable also to the crown, for measuring the cloth, at the rate of a halfpenny a cloth. There were also two species of customs payable on wines: one called butlerage, payable by foreigners importing wines, at the rate of two shillings for every ton of wine; the other, called prisage, payable by natives at the rate of, for every vessel importing ten or more tunes, a mark for the first ten tunes, and twenty-five pence for every two tunes; taken one tunn from before, the other from behind the mast. This was compounded for by the payment of 20s. for each tun to which the king was entitled.

The origin of these customs seems uncertain; Lord Coke is very anxious to establish that they were in the first instance established by the common consent of the realm in parliament. In support of this he cites Philip de Comines (ib. v. 6o 239): "Regis Angliae nihil tale, nisi

convocatis prinsim ordinibus, et assentienti populo, suscipient. Que consuetudo valde nihili laudanda videtur; interiunt enim populi voluntate et assentio crescit robur et potestas regnum, et major ei ipsum auctoritates et feliciora progressus." (The kings of England take nothing of this kind unless the people are consulted. It is only when the people are consulted, and the power seems to me most laudable, for by the intervention of the free will and assent of the people the strength and power of kings becomes greater and their proceedings more fortunate.)

Comines however is speaking after various acts had passed restraining the crown taking them. The history of the customs is called customes antiquae, and customes ex antiquo.

Before and during Lord Coke's time, as well as immediately after it, the origin and nature of this kind of subsidy were most fully and ably discussed. To understand the subject it is necessary to advert to the sources of revenue possessed by the early Norman kings of England. These kings themselves held a large portion of the lands of the country. Some of these were occupied by villeins, which were taxable by their lord at his own pleasure. Others were occupied by free tenants in antient times. These, who originally were bound to perform services of an ignoble kind, such as manuring the lord's land, &c., which services were afterwards commuted for rent. The tenants in burgage, who held lands, &c. in the possession of the royal cities, &c. were not liable to the payment of subsidies. They might be granted a consent in parliament, but not, as was said, except upon extraordinary occasions. Lastly there were the tenants holding immediately of the king, who were bound to perform various feudal services. From these last tenants great profits arose to the king by custom and usage, as relief it presents.

The king also had a right to require contributions from the inhabitants of particular districts towards the expense of repairing bridges and the walls of towns, which contributions were called pontage and murage; and to grant by charter a privilege of being able to make money by charging duties on goods coming into the town. There were also other sources of revenue, the temporalities of vacant bishoprics, the forfeitures arising from felonies, &c. In the earlier periods these seem to have been considered sufficient to maintain the royal state, the courts of justice, &c., and also the ordinary expenses of any wars in which the king might be engaged.

In the sixth year of Richard II., the commons petitioned the king that he would live upon his own revenues, and that wards, marriages, revenues, and forfeitures, and all other profits arising to the crown might be employed to the wars for the defence of the kingdom. In addition however to these duties of defending the kingdom by foreign wars, the king was bound to protect the merchants at sea from the attacks of the pirates, and to supply them with safe conduct twice in the year 'to scour the narrow seas.' To defray the expenses of the royal navy, the king collected at the ports of his kingdom certain sums upon all merchandise imported or exported. These sums were called customs, a word which in itself indicates the looseness and uncertainty of its origin. 'To say the truth,' says Mr. Hakewell, in his able argument during the parliamentary discussion relative to Bate's case in the time of James L., 'all these things began, no man can say certainly when or how, but by a tacit consent of king and people, and the kingdom was grown up beyond the memory of any man.' It is to be observed that Hakewell is arguing against the existence of a royal prerogative to lay fresh impositions. The right to collect some sum seems however to have existed from the earliest times, and the other duties being continually diminished by the alienation of crown lands, &c., while the common charges of the crown increased, the sums imposed of their own authority such sums as varied from the original amount collected, and were complained of as unreasonable by the people. The earlier parliamentary history is full of remonstrances as to the heavy duties and uncustomed impositions, novels de tolle, &c. There was an instance also of a petition by the merchants that they might pay no toll, but be allowed to protect their ships themselves. Ultimately the kings were driven by their necessities, the difficulties of the collection of irregular duties,
and the circumstances of their position, to have recourse to parliament to fix and authorise the sums to be collected as customs. The first statute on the subject occurs in the third year of the reign of Edward I., when the antient or grand customs were fixed at the sums already stated.

It is observable that in no instance was the right of the king to collect some duties disputed; all that is complained of was the mode of their being granted. It was a matter of general consent and acquiescence imposed. Many statutes occur on the subject, in which the king often—when the supply is needed, for instance, 23 Ed. I., as a provision against the French, who it is said intended altogether to wipe out (omnino delere) the English language, which was granted in the same way. That shall be properly applied, and that no aid shall be raised for the future except by consent of parliament. These promises, like the provisions of Magna Charta, which was renewed or confirmed thirty-one times, were generally broken, especially up to the end of the reign of Rich. II. However, they were often repeated, that at last they seem to have acquired some degree of validity, till they were again infringed in a few instances in the reigns of Elizabeth, Mary, and the Stuarts. In these latter times however, such infringements were not passed over with lightness. In the reign of James I. there is the question not of the right to the king to increase the customs upon merchandize, without assent of parliament, was raised on the occasion of his imposing five shillings per cwt. on currants. The king had the same right on the grounds, 1st, that his extraordinary and absolute prerogative was not bound by the statutes restraining him from increasing the customs without assent in parliament; 2nd, because the extra duty was not a burden to the subject, but a subsidy raised in case of a great demand, however raised great discussion in parliament, who pronounced it to be illegal. The writs for ship-money in the time of Charles I. created a similar ferment, and notwithstanding the petition of rights, the question cannot be said to have been entirely set at rest till up to the period of the Revolution.

The petty customs were originally founded on a bargain between the foreign merchants and king Edward I., by which they agreed to pay him the amount of them, in consideration of the protection of most part of the commerce referred to them of all other prises and takings. Butlerage has the same origin, but is perhaps of an earlier date. Prisage is stated by Lord Coke himself to be due to the king by prerogation, and the right of the king to it seems to have been in the situation of an inheritance, since by royal charters it was granted to the city of London and to the Cinque Ports for ever.

Tunnage and poundage was a duty varying in amount at different periods; what is known to them was that the freights upon every tun of wine, and from sixpence to a shilling upon every pound of merchandise coming into the kingdom. The object in granting it was said to be, that the king might have money ready in case of a sudden occasion, and the sum of it was looked upon as being for guarding the sea. This kind of subsidy appears to have had a parliamentary origin. The earliest statute mentioned by Lord Coke as having granted it is 47 Ed. III. In the early instances it was granted for limited periods, and express provision was made that it should have intermission, and vary, lest the king should claim it as his duties. It was generally granted upon condition, or for a consideration expressed, as for the keeping and safeguard of the seas, &c., and in some instances the persons assigned to receive the same, and was improperly expended on the salvation and defence of the kingdom. The duties of tunnage and poundage were granted to Henry V. for his life, with a proviso that it should not be drawn into a precedent for the future. However, every man to whom it was granted afterwards was granted to any king for a less period. These duties were farmed while Lord Coke was commissioner of the treasury, for 160,000l. a year. In the course of the argument in the case of ship-money in 15 Charles I., the king's duties are said to amount to 300,000l. This probably was the aggregate of the customs and tunnage and prisage.

Subsidy in its more usual and limited sense consisted of a rate of 4s. in the pound, on lands, and 2s. 6d. on goods, and duties on the wine, to which (omnino delere) the same fifteenths, were the tenth or fifteenth part of the value of moveable goods. Other portions, such as the fifth, eighth, eleventh part, were sometimes, but rarely, also levied. These taxes seem to have had a parliamentary origin. There are no appearances of the king ever having attempted to collect them as of right; at least Henry III. received a fifteenth in return for granting Magna Charta and the Charta de Foresta. In the earlier periods never more than one subsidy and two fifteenths were granted. About the time of the expectation of the Armada (31 Eliz.), a double subsidy and four fifteenths were granted, and that by the chancellor of the exchequer, Walter Mildmay, when moving for it, said, 'his heart did quake to move it, not knowing the inconvenience that should grow upon it.' The inconvenience did grow very fast, for trouble and quadruple subsidies and six fifteenths were granted. These sums seem to have been at intervals of about four years at that period. Subsidies and fifteenths were originally assessed upon each individual, but subsequently to the 8 Edward III., when a taxation was made upon all the towns, cities, and boroughs, by commissaries, the fifteenth became a sum certain, bureg the fifteenth part of their then existing value. After the fifteenth was granted by parliament, the inhabitants rated themselves. The subsidy, never having been thus fixed, continued uncertain, and was levied upon each person in respect of his situation, and goods. But it appears that a person paid owed in the county in which he lived, even though he possessed property in other counties. And, as Hume observes, probably where a man's property increased he paid no more, though the cases of diminution of property made it to this extent impossible that the subsidy continually decreased in amount. In the fourth year of the reign of Elizabeth it amounted to 120,000l., in the 40th to 78,000l. only. Lord Coke estimates a subsidy (probably in the reign of James I. or Charles I.) at 70,000l.; the 6 Edward III. at 23,000l.; and the 1 Edward IV. the laity, at 29,000l.; a fifteenth at about 29,000l. Eventually the subsidy was abolished, and a land tax substituted for it.

Substance. In general usage Substance means an object; in philosophical speculations it has undergone the change of becoming a sort of idea, with various possible shades of meaning. In physical speculations it has usually been taken as an equivalent to matter; but in metaphysical speculations its meaning, as sanctioned by the highest authorities, has remained true to its etymology (sub-stance, that which sustains, that which endures phenomenon). This meaning will be rendered intelligible by the notion of some Hindu philosophers, who supposed the world to rest on the back of an elephant, and that the elephant stood on the back of a horse, and so forth, through the medium of a logical or mathematical proof, supposed to explain. In adopting their theory, we may add that what the tortoise stood upon was substance.

As we know that all phenomena must depend upon names, of which they are only the manifestation; or, to stand under or supporting the whole, and this we call Substance. It is the fundamental fact of all existence. We can never know it, for we know only phenomena, which are its appearances. We can never conceive it, for the first attempt to conceive it brings it within the sphere of our reason, which is always the sphere of something in the mind, say the sensations, or of something in the mind, a merely logical distinction from its attributes; and it is needful also to know that as the mind can never transcend the sphere of its action, and consequently never know more than the attributes, all that can be predicated of substance must be false, for substance is to it a mere predicate; if it would affirm anything of substance, it must inevitably affirm it by its attributes, which it alone can know positively.

It is from inattention to this latter fact that metaphysicians have blundered and misunderstood each other so constantly. You cannot conceive a point which has neither length nor breadth; you must assume it. You cannot
conceive substance aborn of its attributes, because those attributes are the sole staple of your conceptions; but you must assume it. Analyse as you will, you can never get beyond a vague and negative conception of a certain substratum, which, whenever you attempt to realise it, you must invest with attributes. Glass is a substance, at least is called so in common language. Analyse it, and you find that the glass is nothing but — that it is but a certain number of flint and alkali. Your substance then has vanished with the analysis. It was found to be flint and alkali, nothing more; no distinct element, no substratum was discovered. Where then was your glass substance? The glass was a mere mode of existence of two particles of flint and alkali; it was in itself nothing, it had no existence apart from those particles, it had no substratum. Analyse the flint in the same way, and you will find the flint to be in itself no substance, but a mode of existence of some other particles. And yet you refer in your analysis should be so continued ad infinitum, thus reducing everything to more phenomena; it is impelled to stop somewhere, and to ask, "attributes of what?" and there where it stops it recognises substance. Hence Spinoza's definition of substance being existence.

Fichte, the most scientific expositor of idealism, has denied all substance except that of the Ego, and he says, "Attributes synthetically unit the give substance, and substance analysed gives but attributes; a continued substratum and substance found but attributes." (Wissenschaftslehre, p. 145.) Granted an impossible conception, but not therefore an impossible fact. Fichte assumes that the subjective conceptions — the ideas — is the complete correlation and comprehension of the whole object of fact; and if this point be admitted, his system is irresistible, for attributes being obviously mental conditions, and as beyond them we are conscious of nothing, so nothing but what they affirm can exist. Interrogate consciousness, and you will get no answer that will not make you doubt substance. It knows only attributes. Matter is extended, coloured, and of a certain weight. Yet philosophy has long established that weight and colour are purely mental conditions — are effects produced by matter on the sensation, not qualities of matter in themselves; and Kant has irrefragably shewn that extension to be the form imprinted on all objects by our minds; and even disputing this, there is no dispute that extension quid extension is not matter, and that colour quid colour is not matter, but that matter is something extended and coloured. No; replies Fichte, it is but the synthesis of these attributes, as glass was the synthesis of flint and alkali; and on the Ideal theory, there can be no question of his being correct.

If we dissent from these conclusions, and maintain that there is substance apart from its attributes (though we insist on this distinction being purely logical), it is because the Idealists have not proved the fundamental position on which all such speculation rests, namely, the truth of the correlation between the conception and the object, so that the one should be taken as the entire expression of the other.

In our analysis of substance it is impossible to get beyond attributes; and therefore, subjectively speaking, substance is nothing more than the synthesis of attributes: but does this entitle us to assume that it is equally the case objectively? Not until the subject has been proved to be the complete expression of the other.

But the truth is, attributes themselves are but the conditions excited in us by objects. The Ego noted on the non-Ego, as a subject, and sensations: these mental affections are the subject, and sensations of variously extension, colour, weight, hardness, &c. and these are the all the effects of the action of the non-Ego upon the Ego, and as a consequence these are all we know, and all we know of the non-Ego. To call substance therefore the synthesis of the conception and the object, so that the synthesis of our mental affections is contained all that constitutes the non-Ego, instead of saying that in the synthesis of our mental affections is contained all we can positively know of the non-Ego, it is saying that we include all existence, and that beyond our conceptions nothing exists; it is taking the

effects, yet we are necessitated to assume an incompossible cause or substance. We do not know this substance: we only know what it excites in us, as a man in the dark receiving a blow from a unseen man knows only his individual sensation received from that unknown something; it may be a stick, the butt-end of a gun, or a hammer: he knows nothing of what its nature may be; all he knows is what sensations it excites.

The substratum of Idealism is consciousness. In consciousness there is nothing but transformations of itself — no substance, no external world is given; it knows, it feels, it is conscious of nothing but itself. But consciousness is usually the stronger of Realism, for we are as conscious that what we call substance, or the world, is not ourselves, and does not depend upon us, and is a distinct existence, as we are of our own existence. Hence the universality of the belief of an external world — hence the impossibility of the Idealists conceiving for an instant the non-existence of substance.

In conclusion we may observe, that substance is the unknown, unknowable substratum on which rests all that we experience of the external world: it is the hidden numen whose manifestations as represented in perception we call matter and the phenomena of matter, and of which every positive predicate must necessarily be false, and consequently all inquiry into its nature baseless.

SUBSTITUTION, a very common algebraical process, being, as its name expresses, the act of substituting for any quantity another which is equal to it. A method of approximation, which is frequently used and of great importance, has obtained the name of successive substitution. Let any equation be reduced to the form

\[ x = a + \phi (a + \phi x) \]

where \( e \) is less than unity, and \( \phi x \) a function of \( x \). If we make \( x = a \), the error thereby committed is less than \( \phi x \), being \( \phi e x \), in which \( e \) is less than unity. Take this value as \( a \), and substitute it on the second side, giving \( x = a + \phi e a \); this value is nearer than the last in most cases, for it should be

\[ x = a + \phi (a + \phi e a) \]

Now the error of \( \phi (a + \phi e a) \) will be of the order \( e^2 \), and that of \( \phi (a + \phi e a) \) of the order \( e^3 \). There is then a continual approximation to the true value of \( x \).

Beginning with \( x = a + e a + \phi e a \), in which the error is of the order \( e \), we have

\[ x = a + e a + \phi e a + \phi^2 e a \]

in which the error is of the third order. Repeating terms of the third order, we have

\[ x = a + e a + \phi e a + \phi^2 e a + \phi^3 e a \]

Substitute this again, and we have

\[ x = a + e a + \phi e a + \phi^2 e a + \phi^3 e a \]

in which the error is of the fourth order. Rejecting terms of the fourth order,

\[ x = a + e a + \phi e a + \phi^2 e a + \phi^3 e a \]

and so on: the developments being made by Taylor's Theorem, the celebrated theorem of Lagrange: but the actual method of substitution is sometimes preferable.

SUBTANGENT, SUBNORMAL. [TANGENT.]

SUBTENSE, means any line, angle, &c., opposite to or subtending a line or angle spoken of. Thus the chord of a circle is the subtense of the arc and of the angle at the centre. The term is now not much used.

SUBTERRANEAN FORESTS. [SUBMARINE FORESTS.]

SUBTRACTION, SUBTRAHEND, MINUEND. The process of subtraction is the removal of a part equal to the less from the greater. The quantity to be diminished (minuendum) was called the minuend; the quantity to be subtracted (subtrahendum) the subtrahend; and the remaining part the remainder. The terms subtrahend and minuend are almost out of use, though often very convenient.
The operation of subtraction is often described in a way which might be practised, but is not; and the explanation of the possible mode applied to the actual mode makes confusion. It is obvious enough that if parts of A be subtracted severally from the parts of B, the remainder put together make up the whole remainder. Thus 24 can easily be taken from 76, for 7 tens exceeds 6 tens by 5 tens, and 6 exceeds 4 by 2, so that 52 is the remainder required. But when we come to take 48 from 93, the proceeding mode of treatment would be useless. To remedy this it is proposed in the explanation to borrow one of the nine tens in 94, and to put it on to the 4: then 8 from 13 leaves 5. Now take the four tens of 48, and subtract from the remaining 8 tens of 94; the answer then is 45. The process would be as follows: —

3 8 from 3, impossible: borrow a ten from 90; 8 from 48 13 leaves 5. Take 4 tens from the remaining 8 tens, one of the nine tens having been borrowed.
4 45 and 4 tens remain.

This process is actually used on the Continent, but with us, as all the world knows, there is a different process, as follows: —

3 8 from 3, impossible: take 8 from 13, and 5 remains.
4 Carry one to 4, giving 5, and subtract 3 tens from the remaining 8 tens, giving 4 tens.
4 45 and 4 tens remain.

There is quite a different principle in this process, which is as follows: — If two numbers be equally increased or equally diminished, the difference remains the same. Having arbitrarily increased the three in the upper line by ten, the lower line must be some where or other increased by ten, in order to keep the difference which is all that is wanted unaltered.

The object in view is attained by increasing the upper line by ten units, and the lower line by one ten. We are inclined to think that in the actual performance of subtraction it would be better than the mode usually employed, if we added in thought to the lower to make the higher, instead of passing from the higher to the lower by mental subtraction. Thus the details of the following question are written down, the words in Italics being made emphatic, and the figures written down at the moment they are repeated or thought of: —

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Nine and seven are sixteen (some persons would here take the trouble to say, carry one, and four are five: but in this method, if the last-named word be ten or more, it is a direction to increase the next figure by one). Five and eight are thirteen: four and eight are twelve: eight and seven are nought: twenty and seven are nine: eight and nine are seventeen: one and three are four.

This mode would render easy the comprehensive manner in which the operation of division, extraction of the square root, &c. are performed by some of the continental nations, in which the multiplication and the subtraction by which it is followed are performed at one step: thus —

1243729 ) 43874921483 ( 3527
6555371
33567268
87078103
50900000

The first step is to multiply 1243729 by 3, and to take the result from 43874924: the subtraction is performed by passing to the proper unit in the same deed or that next above, and carrying the tens figure of the dead last employed. The proceeds of the multiplication table are put down without statement, as the computer should learn to remember products without the necessity of repeating "6 times 5 is 30," "4 times 7 is 28," &c.

27 and seven are 34: 6 and 3 are 9 and three are 12: 21 and 1 are 22 and seven are 29: 27 and 2 are 29 and five are 44: nine and seven are 16: nine and four are 13: 1 are 7 and five are 13: 3 and 1 are 4 and 4.

* The student may well ask: from where? The term "carry" is not the proper one.

† Minus in arithmetic (and older persons too) frequently think this word to be eight, but eight is anything, and nought is nothing.

SUBULICORNE (Latreille), a section of Neopterous insects containing the dragon-flies (Libellula, Linn.) of the Ephemerida. The larvae are like the Ephemerida, voracious, and live in the water, aspiring by means of appendages situated on the sides or extremity of the body; the pupa also live in the water, but leave that element to undergo the final transformation. In the perfect insect the wings are always extended, and then at rest are in some species horizontal, in others vertical; the compound eyes are very large and prominent; and the ocelli, or simple eyes, are two or three in number; the mandibles and maxillae are covered by the labrum and labium; the antennae are short, slender, and subulate.

The dragon-flies (Libellulidae) have the four wings of equal length, the tarsi three-jointed, the antennae very small and resembling minute bristles, the eyes extremely large, and generally approximated above; the fore part of the head, or that might be termed the face, has an indated appearance; the legs are rather small, and the abdomen is elongated, sometimes cylindrical, and sometimes depressed, and terminated by membranous appendages. The larvae are pupa, both of which are active, nearly resemble the perfect insects, and resemble them sufficiently for the great development of the labial apparatus, which is elongated and dilated at the extremity, and covers the fore part of the head like a mask.

The Libellulae, or dragon-flies, are divided into three genera by Fabricius. Those species which have the wings extended horizontally when at rest, the head almost globular, the eyes very large and meeting on the vertex, an elevation in front and close to the eyes, and the abdomen depressed, form the genus Libellula as such, or Ephemeridae as Linnaeus called them (our family Libellulidae).

The second genus (Euehna, Fab.) is chiefly distinguished by the cylindrical form of the abdomen and its greater proportionate length. The wings are as in Libellula, and the head is of the same globular form.

In the third, which we shall call, (Fig.) the wings when at rest are elevated perpendicularly; the head is transverse, and the eyes are widely separated. Examples of each of these genera are found in this country.

The second division of the Subulicorne, or the family Ephemeridae, is distinguished from the Libellulidae by the comparative softness of the parts of the mouth, they being of a membranous character in the insects of the present family, and the parts less defined; the tarsi are five-jointed; the inferior wings are much more extended in some species, and the abdomen is terminated by two or three long and hair-like appendages. They form the genus Ephemerus, according to Linnaeus, and were so called on account of their short term of life, that is, in the imago or perfect state.

The Ephemerus, or May-flies, Latreille states, usually appear at sunset, in fine weather in summer and autumn, on the banks of rivers, lakes, &c., and sometimes in such remarkable numbers, that after their death the surface of the ground is completely covered with them, and in certain districts on the Continent they have been collected in cart-loads for manure.

These insects collect together in great numbers in the air, and fly in an undulating manner, constantly ascending and descending, and are so beautifully apprized that the males are distinguished from the females by the abdomen being furnished with two articulated hooks at the extremity, and apparently the anterior legs and the terminal filaments of the abdomen are larger in this sex; the eyes are also larger. In some species, the anterior three or four of the eyes, two of which are elevated and larger than the others.

The female insect deposits her eggs in the water, and these are collected together in a mass, after which it dies, the duration of life in the perfect state being very short in both sexes. When however we consider the transformations, we find their existence is in reality a long one, for in the larva and pupa state some of them exist for two or three years. During this time they are generally hidden, at least in the day-time, in the mud or under stones; sometimes in horizontal holes in the banks of rivers.
SUBSTITUTIVE SUCCESS. [SUBSTITUTION.]

SUCCESSION. When dry succinic acid is acted upon by amonia, water is given off with the evolution of heat, and a fusible crystallizable amide is formed, soluble in water and in alcohol.

According to D’Arcet, it consists of nearly—

Eight equivalents of carbon 

50

Five equivalents of hydrogen 

48

Four equivalents of oxygen 

32

One equivalent of azote 

14

Equivalents 

99

When crystallized, it contains two equivalents of water; its equivalent is then 117.

SUCCESSION, M. Draparnaud’s name for a genus of pulmoniferous gastropods belonging to the Colimacea of Lamarck and the Limacinea of De Blainville. It is the subgenus Chondrus of Pernus.

The shell is ovate, rather elongated, with a large, entire, longitudinal aperture, and a short spire; the outer lip is thin and continuous with the delicate sharp-edged columnella; the inner lip is spread over a part of the body-whorl. The shell may be distinguished from that of Limacina

[LIMNEANS, vol. xiii., p. 501] by its not having a fold or plait on the columnellum.

Cuvier, who places the genus between Chondrus and Clausilia, remarks that the animal cannot withdraw itself into the shell entirely, and that it may be regarded almost as a Tentacella with a large shell. It has, he remarks, the lower tentacula very small, and lives on the herbage and plants on the brinks of streams, whence it has been considered as amphibious. [ELICIDE, vol. xii., p. 416].

The genus Succulentia, Helix nutrita of Linnaeus, whose specific name has the priority, common in moist places, on the banks of fresh waters.

Succinic ACID is obtained from amber by the application of heat, when the acid sublimes, mixed with much ampyreumatic oil and some acetic acid; it is stated that a greater product is obtained when the amber is mixed before sublimation with one-twelfth of its weight of sulphuric acid diluted with an equal weight of water. The acid is purified by treating with dilute nitric acid, by which, unlike most acids similarly constituted, it is not altered or decomposed; by evaporating the solution, crystals of the acid are produced, which possess the following properties:—they are colourless, inodorous, are acid and somewhat acid in taste, and sublime without decomposition when heated. These crystals are hydrated, and are soluble in two parts of boiling and five parts of cold water, and they dissolve also in alcohol and ether; when heated to 305°, the crystals lose half their water. This acid consists very nearly of—

Two equivalents of carbon 

24

Two equivalents of hydrogen 

24

Three equivalents of oxygen 

24

Equivalents 

50

The crystals contain one equivalent of water, making its equivalent number 59. Succinic acid was formerly employed in medicine under the name of salt of amber; it is now chiefly used in combination with amonia, forming succinate of amonia in chemical investigations, especially for precipitating iron from solution.

Succinic acid combines readily with the alkalis, earths, and metallic oxides; several of its compounds with the latter are crystallizable, but are not applied to any particular purpose.

SUCCESSION is a bituminous substance of a peculiar kind, the natural history and chemistry of which have been already detailed. [AMBER, vol. i., 421.] It is not now used in the crude state in medicine, but is employed to yield the oleum succinii, or oil of amber. This is procured by the destructive distillation of amber which is put into a glass, copper, or iron retort, fitted with a glass alembic properly a sand-bath, in which the vessel is heated; the oil passes over, the distillation taking place in the vessel distinct 3, which is called succinum, and the volatilized acid the volatile amide of this substance.

SUCCHAINA. River. [DWINA; RUSSIA.]

SUCKER. [SHANNON.]

SUCKERS. [STWM.]

SUCKLING, SIR JOHN, an English poet, was born at Whitton, in Middlesex, 1608–9. His father was one of
The principal secretaries of state and controller of the household to James I, and was by descent of a Norfolk family. The son is said to have shown in his boyhood great readiness in the acquisition of languages. He died, it is clearly informed as to the place and manner of his education. Aubrey thinks that he was at school in Westminster, but this fact does not seem certain. In 1623 he matriculated at Trinity College, Cambridge, and in 1628, about a year after his father's death, travelled abroad. In 1631 he joined the army of Gustavus Adolphus, king of Sweden, and probably remained on the Continent till 1632. On his return to England he led the life of a courtier, and was distinguished among his companions by his wit. It is said that he brought the splendid appearance which he maintained by the most lavish expenditure. Among his companions were Lord Falkland, Carew, Shirley, and Davenant; from the last of whom Aubrey derived most of his anecdotes of Suckling, whom he has thus described (Lives of eminent Men, Elocutionary Letters, ii., part ii., 545)—"He was famous at court for his ready sparkling wit, which was envied, and Sir William (Davenant) says he was the bell that was bated; he was a man of ready and sparkling wit, which when most set on and provoked. While pursuing a course of fashionable pleasures, among which gambling seems to have most attracted him, he became engaged in a quarrel with a brother of Sir Kenelm Digby, and received from him a wound more serious than he had at first by no means to expect. After this dishonour, his associates looked coldly on him, and the consequent loss of reputation seems to have been accompanied by the decline of his fortunes. About this time we find the first notice of him as a poet. Three of his Poems, upon his Critics," was published in 1638, his "Aglaura," and in 1639, his "Brennoral," under the title of "The Dispossessed Colonel," a satire on the rebels. When the disturbances broke out in Scotland, Suckling equipped himself in 1640 with 1500 l. and a pension of 150 l. a year, and magnificently, that they cost him, it is said, 12,000 l. This extravagance was much ridiculed, and the misconduct and defeat of his men in 1639, in the battle between the Scotch and the Royal army, gave occasion for a ballad, more rigorous and satirical than that written by the young John Myna, a wit of those times, and which is printed in a poetical miscellany entitled Musarum Deliciae, or the Muses' Recreation, containing several pieces of poetical wit,' 2nd edit., 1636. (Percy, Antiquarian Ballads, ii., 322.) In 1640, on the meeting of the Long Parliament, Suckling was re-elected member for Brabant, and took an active share in the party strife that followed; a letter of his is extant, addressed to Henry Jernyn, afterwards Earl of St. Albans, in which he discusses at some length the critical situation of the kingdom; and a second, written in 1640, to the Earl of Albemarle, the Tower, and was in consequence summoned before parliament, and accused of being an accomplice in a design to bring over the French; upon this he fled to France, and died soon afterwards in that country.

He was never been crossed by a fever, or, according to another story, inscribed on his portrait at Knowle in Kent, by a wound in the heel from a rusty nail placed purposely in his boot by his valet, who, after robbing him, wished to ensure safety in flight by disabling his master from pursuit. According to Aubrey, he poisoned himself at Paris. In a pamphlet entitled "A Letter sent by Sir John Suckling from France, declaring his said Estate and Flight," London, 1641, he is said to have stayed some time at Paris, was principal of the French court, and then lived with his wife at the Hague; but no reliance can be placed upon such a production. His death must have been before 1643, as in that year was printed, at London, "A Copy of two Remonstrances brought over the river St. in Caron's English Library," and which are finished with the following lines:


A work entitled "Befall, or from his Works," with a Life prefixed by Rev. Alfred Suckling, London, 1836, has furnished nearly all the few facts contained in this scanty biography. The reader may also consult his Life, by Chalmers, the pamphlet also mentioned, and the appendix to the life of Mr. Chalmers, the sheet printed in 1641, entitled 'The Sucklington Faction.'

In person Suckling was about the middle size, though but slightly made, with a graceful carriage. In the edition of his Works by his nameake is an engraving from a portrait by Van der Neer, "that the most particular resemblance of the portrait as mentioned. His poems relate almost entirely to the passion of love; the fortunes of a lover and the feelings arising from his successes and reverses are described with the accuracy of one personally experienced in such adventures. These compositions, written in the transition period between age of thought and learning, and an age of careless dissipation, present in singular combination the characteristics of the passing and the coming generation. In the more or less intimate love of classical authors, and in the strained intricacy of wit, the style of Suckling somewhat resembles that of his contemporaries; while in the licentiousness of his subjects, the gaiety and ease of expression, and the strange mixture of grossness and refinement of feeling, he bears witness of the condition of Charles II. His ballad of 'The Wedding' has been justly celebrated for the truth and naïveté of description, and the happy boldness in the use of homely imagery. The songs, 'Wise, dearest, I but think of thee,' and 'Tell me, ye juster generation,' and many other of his songs, are written in remarkably pure English, but in a style too studied and elaborate for such compositions.

SUCTORIAL CRUSTACEANS. M. Milne Edwards, in his valuable work on the classification of marine animals, (Buffon, remarks that this great division of the class Crustacea is connected intimately with the Entomotricha, and especially to the order Copepods, and he acknowledges that it would have been perhaps more natural not to separate it from the former than from the latter. But, as has been already mentioned, he points out that the group is distinguished from all the animals of the same class by the conformation of the buccal apparatus. In fact, he observes, the mouth, instead of being furnished with foliaceous jaws and mandibles proper for dividing solid aliment, is prolonged into a tube of a beak, and cannot give passage to any but liquid substances. These crustaceans therefore are nourished by the juices which they obtain from the bodies of other animals only; and this organic disposition renders them essentially parasitic in nature. Though all its physiological importance, brings with it rather slight anatomical differences; for, in the crustaceans, as in the insects, the same parts are modified in their form, to constitute, according to the case, an apparatus from an organ of digestion, an organ of suction. This last is essentially composed of a conical tube resulting from the elongation of the labrum and the lower lip. There are almost always to be found two styliiform pieces, which are evidently the analogues of the mandibles of the masticating crustacea (Crustacea Brachyura), but which here fulfil the office of small lancets, or rather, of the instrument employed in surgery in dropical cases known as the trochar. Lastly, there exist ordinarily on each side of the base of this beak other appendages, the hinder of which are represented by the teeth, and the anterior pair are the superior crustaceans, and serve the animal as the instruments to hook or attach itself to its prey. The feet are, in general, formed as in Cylclops (Branchiopoda, vol. v., p. 310) and the other Copepods, that is to say, they are short, and sometimes entirely distinct and composed of several joints, and it is worthy of note, that, as in the greater part of the crustaceans, the number of these organs amounts to but four pairs; but, in the group before us, they become deformed by being entirely developed, and they are evidently developed to resemble the Suctorial Crustaceans and the Copepods, is furnished by the metamorphoses which they undergo in their youth; and it is a remarkable fact, that whilst in the adult state they offer the most variable forms, they have at their birth and first division of the young Copepods, and the greater part of the young Branchiopods; in the first period of their existence it is even impossible to distinguish them from the young of Cylclops.

M. Milne Edwards remarks that this subclass divides

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itself naturally into two principal orders, and he has thought it is best to treat them separately. This last, he observes, is ordinarily arranged by zoologists among the Arachnida [Arachnida], but he is of opinion that their more proper place is in the class Crustacea. The three orders proposed by M. Milne Edwards are the Stephonostomes, the Lernatae, and the Acrasomata Crustacea.

1. Stephonostomes.

This order was established by Latreille, and comprehends all the Suctorial Crustacea whose thorax, composed of nearly all the segments, is furnished with cuticular feet.

M. Milne Edwards describes these animals as having the body divided into three parts: the head, the thorax, and the abdomen. The first is large, and carries a pair of antennae, a sucker furnished with styloform mandibles, and anchor-like or prehensile jaw-feet, generally three pairs in number. This ephippial portion of the body is, in general, more or less clypeiform, and is confounded with one or two of the first thoracic rings. The normal number of the constituent segments of the thorax is five, but in consequence of the sol- dering of the parts, this middle portion of the body offers mostly only two, three, or four distinct joints. The last thoracic ring is apod, and, in the female, carries two or three osiferous tubes. Finally, the abdomen is, in general, rudimentary, and is furnished with a pair of appendages, disposed so as to constitute ordinarily a small caudal fin. The general form of the body varies much, and sometimes departs considerably from that which may be considered as normal in this class of annulose animals.

The Stephonostomes are divided into two families—the Peltocephala and the Phascolephyra.

Peltocephala.

This family has less affinity with Cyclopo than some of the Phascolephyra, but they offer a more complicated structure, and consequently appear to M. Milne Edwards to deserve precedence.

The head is very large, shield-like, and, in general, much larger than the thorax or abdomen; it resembles a disk, slightly convex above, delicate on its edges, and truncated behind, where it is conformed with the first rings of the thorax. On its upper surface two small smooth eyes may be almost always distinguished; they are closely approached to the mouth-feet. The hind part of the thorax, divided transversely.

The thorax is composed of a variable number of joints; sometimes two only are distinguishable, sometimes three or even four, according to circumstances. The first segments are conformed with the head, or this soldering extends to but two of these rings, or even to one only. For the rest, the aspect of this portion of the body varies much, for sometimes the dorsal segment of these rings presents nothing remarkable, and it sometimes gives rise to great laminae, which resemble the elytra of insects.

The abdomen is but little developed, and presents no appendage below, but terminates by two small natatory blades ciliated on the edges, or by a species of trilobated fin.

The Stephonostomes of this division, the same essential characters, and is composed of a pair of antennae, a buccal apparatus, and four pairs of feet.

The antennae, two in number only, are inserted very far from the mouth, and are short, flattened, and directed outward; they are always composed of two or three small lamellar joints, and are never sectacous nor annulated.

The buccal apparatus is composed of a sucker, of divers rudimentary appendages, situated on each side of its base, and divided into a leps or three to five articles. The mouth, a large, conical, and directed backwards; two unequal pieces are there to be distinguished, which are soldered by the edges throughout the greatest part of their length, but remain free towards the end, and leave between them, at the base of this species of beak, a circular triangular aperture: one of these laminae is inserted between the mouth and the front, and represents the labrum or upper lip; the other, situated backwards, is analogous to the lower lip of the masticating crustaceans. Between the base of these two lips springs, on each side, an appendage, which evidently replaces the mandibles of these last animals; but which, instead of being short, stout, and denticiform, is slender, very much elongated, and similar to a stylus with a dentilated point; these styliiform jaws penetrate into the food by means of a stylet, which issue from this inner aperture and advance into its interior, so as to come out by the terminating aperture, and serve as a pair of lancets when the animal wishes to suck its prey. A little outwards is found a second pair of appendages, which is reduced to a nearly oval, quill-like bladder, furnished with natatory feet.

The Stephonostomes are divided into two families—Phascolephyra.
Caligians.

There is nothing abnormal in the conformation of the thorax of this tribe, the thoracic rings being simple, and without dorsal appendages. The cephalic buccular is large, more or less divided, and has the hypostome, the latter extremity of which covers the base of the antennæ; the posterior angles of this carapace are prolonged more or less far on each side of the thorax, and the portion of its posterior border, comprised between these two prolongations, is confluent with the front, or even the second or third thoracic segments. The result is, that the thorax is only composed of two, three, or four distinct joints. The feet are furnished with long plumose bristles; and the abdomen is terminated by two small plates directed backwards, and carrying no lateral appendages.

Genera.

Caligus (see the article and the arrangement of M. Milne Edwards, who divides the genus into several sections, Cautilamus, Tryptus, and Nogagus.

Pandarians.

The small crustaceans collected by M. Milne Edwards under this name, are remarkable for the lamellar prolongations with which the upper part of their thorax is furnished. These appendages, he observes, often resemble the elytra of insects, and their number is sometimes consider- able; there may, be as many as three of them furnished. In general the head is less enlarged and less cleftyforme than in the Caligians, and the feet are only rarely furnished with plumose seta; their terminal ears are often only represented by fainacious submembranous lobes; and the abdomen frequently presents on each side of its terminal piece a more or less projecting lamellar appendage.

M. Milne Edwards subdivides this tribe into two small groups, principally characterised by the general form of the body, and by the disposition of the oviferous tubes, which, in the one, are exposed and extended in a straight line behind the body, whilst in the other these tubes are coiled upon themselves and hidden between the superior surface of the abdomen and a cleftyforme lamina which springs from the last thoracic ring.

The genera Entyphorus, Dinemoura, Pandarus, and Phylophora, form the first of these groups. Cecrops and Lernagrus belong to the second.

Our limits will only permit us to illustrate this tribe by the genus Phylophora.

The type of this last-named genus is, according to M. Milne Edwards, who established it, very remarkable from the lamellar appendages with which its back is covered. In its aspect it approaches the Anthoxamæ, but in the structure of its feet and in its general organization it is not separable from the Pandarids. The only species known is Phylophora cornuta. Length about ten lines.

Locality.—Near Tongataboo.

Phylophora Cornuta. (M. E.) a, seen from below.

In this division of the order Siphonostomes, M. Milne Edwards describes the head as not enlarged, but lamellar and cleftyforme as in the preceding family, and the antennæ, instead of being short, flattened, and barinquisitæ, as formerly, cylindrical, elongated, and composed of five or six joints, the size of which diminishes gradually from the base towards the point of the organ. It is also to be noted that the apparatus of suction is, in general, less developed in these crustaceans, than in the Caligians; this is the object of conformation of these appendages which would appear to represent the jaw-feet is less constant: the feet are not soldered on the median line, and consequently do not constitute unequal fins, as is the case in the preceding family.

M. Milne Edwards divides the Pachycephales into two natural groups. The Ergasilians and the Dichelestians: the first, he observes, establishes the passage between Cyclops and the Lernæides; the second, between these last and the Pandarids.

Ergasilians.

This small group closely approaches to Cyclops, and is remarkable for the pyriform conformation of the body, the size of the head, and the development of the abdomen.

Ergasialis, Bunoecus, and Nicthoe. Species of Ergasia are found attached to the gills of the pike and eelpout (Erg. Stéloïdus); to those of the eel (Erg. gabbius); and to those of a Silius (Erg. tristacæ). The only species of the genus Bunoecus known is Bunoecus Voltalinæ (Erg. voltalinæ). This species is characterised by the presence of a branch of the gar-fish (Exon Belone), Nicthoe includes but one species (Nic. Astaci) which is of a rosy colour, about a line in length, and is found upon the branches of the lobster. The young Nicthoeæ, leaving the egg, resemble the young of Cyclops, and want the thoracic lobes which, when they are adult, give so strange an aspect to these animals.

Dichelestians.

This tribe is easily distinguished from the Ergasilians by the elongated form of the body, the smallness of the head, and the frequent rudimentary state of the abdomen. It is also worthy of note that their feet are much less developed than in the Ergasilians, and that the organs by which they fix themselves on their prey are, on the contrary, more developed, announcing a more essentially parasitic life.

Genera.

Anthoxamæ. Dichelestia, Nemesis, Lamproglæna.

But one species of Anthoxamæ is known (Anthos Smithi), about ten lines long, and found upon a Squalus. M. Milne Edwards remarks that the Caligus crusianus of Abildgaard much resembles this species, but seems to be more stout about the head, and to have the cephalic buccular wider for-ward.

Dichelestia, too, comprises but one species (Dich. Sturiomé). It is about one inch in length, and fixes itself on the branchial apparatus of the Sturgeons. The thorax is divided into four portions in the male, and into five in the female, by internal divisions on each side of which the male is small in the female, about half as large as the last thoracic ring in the male. Neither does Lamproglæna include more than one species (Lamp. pulchella), which is found on the gills of the chub.

Lernææ. (Lernæides, M. E.)

This order is principally distinguished from the Siphonostomes by the rudimentary state of the whole appendicular system, which is only represented by vestiges of limbs or simple tegumentary lobes without articulations, and proper only to serve for anchoring the animal on the prey at whose expense it lives. The Lernææ are remarkable for the oddity of their shape, which, in general, departs greatly from all the ordinary forms in this class, and seems to be the result of a monstrous development. In youth their conformation is normal and much resembles the young of Cyclops; they are then provided with a frontal eye, and natatory ears which permit them to move with agility; but, after having undergone a certain number of moults, they cease to lead an aquatic life. The female then lives on some other animal, and the males, which are much smaller, hide themselves, in general, under the abdomen of their female and near the vulvar aperture. The organs of locomotion, then rendered useless, waste away or become deformed, so as to be unfit for the office which they were originally intended to execute. The eye nearly always die.
appears, and the general configuration of the animal changes so as to make it not recognisable. The females especially acquire the most singular forms. They become very large, and solder themselves, so to speak, on their prey by the aid of simple cutaneous appendages or certain members transformed into such appendages. The male in extreme cases, and depart less from their primitive conformation, but the head becomes larger, and the jaw-feet, transformed into instruments of prehension, and destined to fix the animal on the part which is to be its habitat, acquire a great relative development.

We must here pause for a moment, to mark this provision for the welfare of the animal. If all the young went to one fish, that of the parent for example, as would probably be the case if they were born blind and with organs only fit for aquatic life, it would die. The single generic form of parasites would be defunct with it. But the young Ler- nea is hatched in a form that enables it to swim about and feed on minute animals; and, being furnished in this state with eyes, it has not only the means of temporary subsistence whilst leading a wandering life, but also of selecting its proper species on which it is destined to feed. Then the locomotive limbs are gradually changed to organs of attachment, the eyes disappear, nutrition is the object till the organs of generation become fully developed, and, in this, as in some other cases, the perfection of the species consists not in the enjoyment of locomotion and vision, but in that state which renders it fit for the continuation of the species.

M. Milne Edwards remarks, that zoologists have mis- takenly supposed the Lernaeid to be more separated from the Crustaceans, to place them among the worms. Desmarais, he observes, is one of the first authors who have clearly indicated their natural relationship with the ordinary crustaceans; but, he adds, it is only since the knowledge of the history of life put an end by these parasitics in the commencement of their life, that one has been able definitely to assign to them a place in the natural series of the crustaceans, and the acquaintance with these changes is principally due to that skilful observer, M. Nordmann. M. Milne Edwards observes, that there is no branch of the natural history of the crustaceans so little advanced as that relative to the Lernaei; nearly all remains to be done, and he expresses a hope that M. Nordmann will not abandon a pursuit which has already conducted him to results so important.

M. Milne Edwards divides the Lernaei into three families, characterised by the manner in which these parasites attach themselves to their prey. Some fix themselves by means of great brachiform appendages, united together towards the end and terminated by a horn-like median bone. Others adhere by their jaw-feet, which are armed with very strong hooks. Others again attach themselves to the whole head, which is furnished for this purpose with horizontal prolongations of various forms, and these are cor- respondent to the Lernaeops of M. de Blainville, and may be designated as Lernepodians; the second have the genus Chon- dracanthus for their type, and form M. Milne Edwards's family Chondracanthi; and the third he denominates Lernecercians, because the genus Lernercus belongs to that family, and the name recalls one of their principal characters. With regard to the establishment of generic divisions, and the characters of species, he can only, he ob- serves, refer, in the greater number of instances, to the mode of organisation in the females; for the males are nearly entirely unknown to him, and, in his descriptions, the females are designated, unless the contrary is specified.

Chondracanthi.

The family Chondracanthi fix themselves upon their prey by the aid of two anchor-like jaw-feet, inserted at the anterior extremity of the head, and under the front. The thoracic appendages do not serve for the same use, and have the form of ordinary two-cored feet of extreme small- ness, or at least, appear as such at their extremity, and not prehen- sile. The head is, in general, too small to serve as a thorax, and nearly always carries a pair of antenna, and two pairs of unequal and anchor-like jaw-feet. On the sides of the mouth may be ordinarily perceived a pair of appendages, which represent the second pair of jaw-feet, and which are sometimes anchor-like, similar to the others, but are often rudimentary. The mouth is sometimes situated very far behind the anterior jaw-feet, and is armed with small ap- pendages representing the mandibles. The number and disposition of the appendages corresponding to the thoracic foot vary; sometimes two pairs only are to be counted, sometimes three, and even four. The ovariiferous tubes spring from the posterior edge of the body, so that the abdomen is rudimentary, and is only represented by one or two small median tubercles. The male is often found attached under the anus of the female; he is extremely small, and only resemble her in the least, but differs from the males of the succeeding family. (M. E.)

Genera.

Selius, Athlon, Clavelia, Cynicus, Tucua, Peninsula. Lernarchoerus, Chondracanthus. Selius consists but of one species (Sel. bilobus), found on the branchia of the Dotted Polyptus; nor does Athlon com- prise, more consisting, only of Athlon quadratus, found on a Serranus, and about a line in length. Clavelia has two species, C. Gobio, and C. Holhub, and, M. Scori. Cynicus has only one species (Cyc. gracilis), found on the branchium of a cod-fish; and this is the case with Tucua, which has only one (Tuc. impressus), found on Didon Hystera. Peninsula has but one (Pen. Fistula), found on Zeus Aper. Lernarchoerus consists of two species, separated by M. Milne Edwards into two sections; Lernarchoerus Puy, found on a Brazilian Plateau, and Lern. paradoxus, found on the mullets. M. Milne Edwards remarks that Lernar- chopus Musae (De Bl.), found on a Didon from Manilla, belongs to his first section Chondracanthus is separated by M. Milne Edwards into two sections, with subdivisions, and contains seven species: — Ch. corinus, found on several flat-fish (Pleuronectes); Ch. gracilis, found on the border of umbrellas; Ch. Soley, found on gurnards; Ch. Triglae, found on gurnards; Ch. Merlucci (from which the Ch. Xiphius of Cuvier does not appear to M. Milne Edwards to differ, and to which he thinks Lernar- radus of Müller, found in the buccal cavity of Coryphaena hippurus, appears to be very close); Ch. Zeli; and Ch. De- larochiana, the last found upon the thunny.

Lernepodians. In the females of this group the head is formed nearly as in the Chondracanthi, that is to say, distinct from the thorax, furnished with a pair of antennae, and armed with two pairs of anchor-like jaw-feet. But the anterior jaw- feet are less proper for serving these small crustaceans for attachment to their prey and the thorax which carries neither feet nor fleshly appendages, similar to those which represent the two first pairs of thoracic members in the preceding division, give origin to a pair of very large brachiform prolongations, which unite together sometimes at all their branches, and terminate by a horn-like bone, by the aid of which the para- site strongly adheres to the animal on which it has estab- lished its dwelling. These organs of adhesion appear to replace the first pair of thoracic limbs.

The male of one section from Lernepodians is known, and where known differs extremely from the female. He has the body divided into two very distinct parts; one anterior, the cephalic, which carries the antennae, a pair of upper unequal jaw-feet, the sucker, and, farther back, two pairs of well-developed appendages, which represent the posterior jaw-feet and the arms of the female, but which have the form of stout hands carried on a cylindrical pedun- cle, and terminated by a small ill-formed pincer. The young undergo the ordinary metamorphoses. (M. E.)
There are six genera:—Tracheliastes, Basoisthes, Achtheres, Branchiella, Lernaeopoda, and Anchorella.

Tracheliastes has three species, divided into two sections:—Tr. polyepclus, found on the fins of the eel; Tr. maculatus, found on the scales of the bream; and Tr. Stellifer, found on the branchial arches or within the mouth of Silurus Glanis.

Basoisthes comprises two species:—B. Hucsonis, found on the gill-cover of the huchen (Salmo Hucho), and B. salmonea, found on the grayling. M. Milne Edwards states that Lernaeopoda Bronniiartii (De Bl.) belongs to this genus.

Achtheres consists of but one species (Ach. Percaurus), found on the fins of the river Perch and of the Sandra. Lenth about two lines.

Branchiella comprises five species, distributed into two sections, with subdivisions:—Branchiella Thymmi (length about ten lines, of male about half a line), found on the gills of the Thym; Br. impudica (length about four lines, of male about a third of a line), found on the gills of the Haddock (Gadus Rigifrons); Br. impudicus (about three lines in length, male unknown), found on the gills of the Sapphirine Gunner (Triglia Hirundo); Br. rostrata, closely approaching the preceding, found in the Greenland Seas upon Peneus setarias; and Br. Lophi, found on the gills of the Sea-Devil, Food-fish, or Frog-fish, at Naples.

Lernaeopoda consists of five species, divided into two sections:—Lernaeopoda stellata, found on the fins of a Sterlet in Norway; Lern. etesiana (about two inches in length), found fixed to the eye of a Shark in the Polar Seas; Lern. Carassius, nearly approaching the preceding, found on the Salmon in the north of Europe; Lern. Galei (length about three lines, male about the same size), found on the fins of a Tobe Shark (Milnodre); and Lern. abea (about two lines in length), found upon Squalls Ancisthias, the Picked-dog, or Hound-fish.

M. Milne Edwards thinks that Lern. Dalmani, found on Rana Buia, the Skate; Lern. branclata (about two lines long), found on the Red Gunner; and Lern. salmonea, belong to this genus. The last species does not seem to M. Milne Edwards to be determinable specifically, and he makes the same remark on the Lernaea found by Hermann on the Dace.

M. Milne Edwards is of opinion that Lernaeomyzon pyriformis and Lernaeomyzon sturianum (De Bl.) belong to this genus, as well as Lernae auleana of Strom and Lernae anomala of Abdillgaard.

Lernearceriates.

The female Lernearceriates, like the Chondracanthians, fix themselves to their prey by the anterior extremity of their body only, and have no brachiform thoracic appendages serving for this purpose, as may be seen in the Lernaeopoda; but the arming of their mouth is far from having the same form which the appendages among the Chondracanthians, and the whole head of the parasite is plunged into the tissue of the animal on which it establishes its dwelling, and is there retained by horny prolongations, of varied form, which spring from its posterior or occipital part. In general the head is in every case distinct from the thorax, and seems to be completely deprived of antennae; the mouth is armed with but one pair of jaw-feet, which are simple and unicornif. The feet, when they exist, are of extreme smallness, and sometimes no trace of them is to be perceived. The portion of the trunk which is situated behind the point where the ovisferous tubes take their origin, and which represents the abdomen, is, in general, much more developed than in the other females of the same order.

The male of the Lernaeomyzon is unknown, except in very few species, and, where known, seems as imperfect as that of the Chondracanthians; his body is globular, offers no distinct thorax, and does not carry rudiments of feet behind the appendages which represent the jaw-feet. The metamorphoses which the young Lernaea are analogous to those of the other Lernearceriates. (M. E.)

Genera.

Penella, Lernocerina, Lernocerca, Lernaea.

Penella consists of four species, divided into two sections:—Pen. Sagittata, an American species of the Norway Sprat; Pen. Lophius, found on the Flying-fish, Eucocyclus volitans; and Penella Sultana (about an inch long), found in the mouth of Carex Ascensio.

Lernocerina, also divided into two sections, comprises three species:—Lern. Lesueurii (about two inches long), found in the American Seas upon the Flying-fish; Lern. montisatus (about an inch long), found fixed to the selerotic coats of the eye of the Sprat (Clupea Sprattus); and Lern. abdominalis (about two lines long).

M. Milne Edwards states that Lernocerca turritata (De Bl.) belongs to this group, and that it much resembles the preceding species, but is distinguished by the abundance of the abdominal portion of its general structure, and by the extremity of the opinion that the genus Spynorion of Cuvier is too imperfectly known to enable him to determine its natural affinities, though it appears probable to M. Milne Edwards that its place is between Penella and Lernocerca.

Lernocerca comprises four species, divided into two sections and subdivisions:—Lern. calvifera (about eight lines long), found in Sweden on Cyprinus Carpio; Lern. Sprattus, found in Lake Erie, on Cichlas anua (Lesueur); and Lern. radiata, found on Clupea Tyrannus, United States of America.

M. Milne Edwards thinks that Lernaea ocularis of Cuvier belongs to the second section of the genus Lernocerca. It is found fixed to the eye of Herrings.

Lernaea consists of two species, each placed in a separate section:—Lernaea branclata, found on the gills of the several species of Gadi, in the North Sea; and Lernaea multicornis.

M. Milne Edwards states that Lernaea cyclopertina is distinguished from Lernaea branclata by certain tubercles about the head and neck. He remarks that M. Kroyer has represented it without horns, but he thinks that those which arise from the mutilation of the animal observed by M. Kroyer. This parasite is found in the Greenland Seas on Cyclops perpusillus.

The subjoined cut, from Sowerby's 'Miscellany,' shows the external appearance of a sprat infected by these Lernaeas. Mr. Sowerby names the parasite Lernaea Sprattlis (Lernaea Sprattis). These crustaceans are stated to be...
The reader should refer to the writings of Fabricius, Latreille, Brunner, Montagu, Lamarck, Leach; and especially of Dr. Johnston, in Zool. Journ., Miscell. Zool., and Mag of Zool. and Botany, relative to this highly interesting order of animals.

M. Milne Edwards states that it is not without doubt that he has arranged in this place a small group of articulated animals which have been considered by so great a part of zoologists as belonging to the class of Arachnids, but which seem to him to have more analogy with the Crustacians, for they have no tracheo nor pulmonary sacs, but an aeriferous system. It appears the water only by means of the general surface of the common teguments, as he had already pointed out in many inferior crustaceans.

In the general form of the body these animals approach the Lamellibranchs, and especially Oysteria. Their head is elongated, sometimes cylindrical, sometimes conical, and presents at its extremity a trilobated buccal orifice. The thorax is constantly divided into four segments, and the abdominal is only represented by a small tubular joint fixed to the posterior end of the last peneum. The thorax, the abdomen carries no appendages, and the eyes, four in number, are grouped on a small median tubercle, situated on the dorsal surface of the first joint of the thorax. This segment often carries at its extremity a pair of jaw-feet terminated by a well-formed pincer, and sometimes furnished with a palp, which is elongated and composed of many joints. In the male, the number of pairs of feet is equal to that of the joints of the thorax; but in the female there is a pair of pedoform supplementary appendages fixed to the first joint of the thorax, which have been often improperly called, much smaller than them, and serving to carry the eggs. The feet are very long, directed outwards, and composed of nine joints, the last of which constitutes a more or less strong claw.

The digestive tube traverses the body in a straight line, and presents in one of the genera of this family (Nymphum) a very remarkable disposition; it gives origin, to the right and to the left, to a series of prolongations, which are tubular and closed above, which advance very far in the interior of the corresponding feet, and which are the seat of a peristaltic motion. There exists besides a vague circulation. No trace of respiratory organs is perceptible, and the disposition of the organs of generation is not known; it is only to be remarked that in the Psychogonum may be perceived on the second joint of the posterior feet a pore which seems to be the orifice of this last apparatus.

The Psychogonides are all of small proportions, and live in the sea; some are found under stones, others live, it is said, on the upper margin of the rocks, by their means. This hole is distinguished from its congeners by the stoutness of its form, and the size and shortness of its feet, which are strongly contrasted with those of Nymphum gracile. Only one species appears to be known, Psychogonum litorale; this is the sole species of the genus, and it is a mere larva. Length about four lines. This Araneiform crustacean inhabits our seas and those of France, and is found on Ascidians and various fishes.

\* Previously used for another crustacean. [Orythia*]
Younger to Suetonius, the son, from one of which (i. 16) it appears that Suetonius was then practicing at the bar. In another letter (v. 11) Pliny urges him to publish some works which he had written. At the request of Pliny, Trajan granted Suetonius the Jus trium liberorum, by which a Roman citizen is entitled to three books of his works. His father had children, and was freed from the disabilities imposed by the Lex Julia et Papia Poppaea on those who were married and had no children. He was Magister Epistolarum to Hadrian, but lost his office at the same time that Septimius Severus took the throne. He had, however, for many years regarded the Court as his home, and many others were dismissed by Hadrian on the ground, which is very obscurely stated, that they had, without the emperor's permission, conducted themselves towards his wife Sabina with more familiarity than was consistent with the respect due to her. (A.D. 150-161.)

Nothing more is known of Suetonius. His friend Pliny calls him a most upright and learned man, whose character rose in his estimation the better he became acquainted with him. Suetonius was a voluminous writer; a list of his works is given by Suidas (v. τα άριστα) as follows: one book on sports or pastimes among the Greeks; two books on Roman games and shows; one book on the Roman year; one book on the notes or marks used in writing; one book on the 'Respublica,' a treatise on politics and the condition of the people; another on the names of persons and articles of dress; a treatise on words of bad omen; two books on Rome and its institutions and manners; a work in eight books on the Caesars from Julius Caesar to Domitian, which is still extant; and a Stemma or Genealogy of illustrious Romans, which, however, is not extant. He also wrote three books; a work entitled 'De Institutiis Officiorum;' a work on the Praetors, the eighth book of which is quoted by Priscian; and a work 'De Variis Rebus.'

The only complete work of Suetonius, which is extant, is the 'Lives of the Caesars,' referred to above. It is extant in two parts or books, but sometimes distributed into eight books, as appears from Suidas, and from several manuscripts. This work comprehends, as already observed, the Caesars from C. Julius Caesar, the Dictator, to Domitian, both included. This work is subdivided into parts, and consists of the Life of C. J. Caesar wanting, because it begins rather abruptly with the events of his sixteenth year; but the conjecture has nothing else to support it. The biographies of Suetonius are peculiar in their construction. He does not strictly follow the chronological order of events. There is not an attempt at rhetorical ornament or effect; the style is characterized by correctness, brevity, precision, perspicuity, and simplicity; there are no idle words. There is an air of impartiality about the whole work, from which a reader derives greater comfort than he would get from the laboured pictures of Tacitus. Vopiscus calls him a faultless and most impartial writer, and a lover of brevity. The views of the Caesars are stated circumstantially and dilly, as facts well ascertained. These biographies abound in facts. Indeed their chief merit consists in being a most copious source of materials. Accordingly the style has been appropriately called by La Harpe anecdotal. That Suetonius was a learned Roman, as his friend Pliny states, is apparent from his work. He seems to have had a competent knowledge of the antiquities and the constitutions of his country. Like Tacitus, he frequently mentions the legislative enactments (Senatus Consulta) which were passed under the Caesars, but neither is he nor any other Roman historian always a safe guide in such matters. The work of Suetonius does not, however, contain enough to enable one to form a correct idea of all the public events which happened in the life of each Caesar. It is a valuable work for the early Imperial times, and if used judiciously with other authorities, it might form the basis of something like a satisfactory history of the period. He consulted official documents, and availed himself of sources of information which are now entirely lost.

The editions of the 'Lives of the Caesars' are very numerous. About fifteen editions were printed before 1500. The first edition, which was published in Roman folio, by G. A. Campani. One of the best editions is that of Isaac Casaubon, fol., Paris, 1610. There is a small useful edition, with a selection of notes, by J. Schild, s.vv., Lugd. Bat., 1647, &c. Among the other editions, Suetonius is those of J. G. Grassow, Oudendorp, and Ernesti. A list of the editions is given in Schweigger's 'Handbuch der Classicen Bibliographie,' Leipzig, 1834. The 'History of the Twelve Caesars' was translated into English by Philemon Holland, fol., London, 1606. There are four other English translations, the last of which is by A. Thompson, s.vv., London, 1786, with annotations and a review of the government and literature of the different periods. There are French, German, Dutch, and Spanish translations. There is also an extant small treatise 'On Distinguished Grammarians' by Suetonius; and another 'On Distinguished Rhetoricians,' consisting at present of only six chapters.
Cupid; in the second, the Muse, and a grand composition of many figures, of Phaeton entreating Apollo to allow him to drive the chariot of the Sun; in the third, Diana surprised by Acteon, Diana detecting the pregnancy of Calisto, and the triumph of Nepenthe. These works have been universally preferred to those of Le Brun: they have been engraved by Bernard Picart and others, in nineteen plates, and were published in Paris, in 1640, in folio, under the title 'Les Peintures de Charles Le Brun et du Roi, suivies de ses meilleurs dessins, et de plusieurs des dessins qui devaient la maison du Président Lambert, dessinées par Bernard Picart, et gravées tant par lui que par différents Graveurs.'

In 1655 Le Sueur's labours were terminated by his death in his eightieth year of his age; a constant exertion, and an excessive application of medical science, had enriched him with many friends, but the report of his having been poisoned is without foundation; to be disliked by friends, is the common lot of all men of extraordinary abilities. That Le Sueur's great talents engendered an active jealousy among his rivals, is generally allowed, especially upon the part of Le Brun, who in his own person barely expressed his satisfaction at the death of Le Sueur, saying that he had been a thorn in his foot. It cannot be doubted, that if Le Sueur had lived, the rising influence of Le Brun would have been seriously checked, and the French school of painting would have acquired considerable importance, and the reputation of France in this art, from that which it has pursued from the time of Louis XIV. until very late years. Although Le Sueur is now generally acknowledged to have been a great painter, during his lifetime his talents were never duly appreciated, nor was the true height of his abilities attained, and through ignorance and jealousy, he was greatly superior to his more successful rivals, he would certainly have been much greater painter had he had equal advantages with them. He never left Paris, he married very young, and being very badly paid for his works, he was continually engaged in the practice of his taste by visiting Italy and studying the great works of its famous schools, or he would otherwise most probably have ranked with the greatest masters of Florence or of Rome. His style is, a deficiency in a thorough mastery of the rules of figure, a very slight touch, and a heavy and monotonous tone of colouring; some of his figures also want life, and appear to want purpose; in composition however, in character, and in the casting of draperies, Le Sueur has seldom been surpassed; quite as apparent among the properties requisite to constitute a great painter.

When the Royal Academy of the Fine Arts was established in Paris, in 1669, Le Sueur was appointed one of the twelve assessors or professors; he had been previously elected to a seat in the college of the surgeons, at the age of nineteen. His style had no influence upon the arts in Paris; his only scholars were his three brothers, Pierre, Philippe, and Antoine Le Sueur, Le Fevre, and Nicolas Colombe. His own portrait, painted by himself, has been engraved by C. N. Lucrai in 'Les Oeuvres de Le Sueur;' there are 110 prints from his works.

(Felibien, Entretiens sur les Vies et sur les Ouvrages des plus excellents Peintres, &c.; D'Argenville, Abrégé de la Vie des plus fameux Peintres; Réveil and Duchesne, Musée de Peinture et de Sculpture de France.)

SUEZ, ISTHMUS OF, connects Africa with Asia, and separates the Mediterranean from the Red Sea. Its extent from north to south a little exceeds seventy-two miles. The most northern recess of the harbour of Suez, on the Red Sea, is called the Bay of Suez, and the southern village of Tynieh, on the Mediterranean, near the arm of the Nile, which in ancient times was called the Pelusiac, and which at present is blocked up with sand, is only about thirty miles north of 31° N. lat. The advantages which would accrue to the commerce of the Mediterranean from the southern and eastern countries of Asia, from a canal navigable for large vessels being made across this isthmus, are obvious, and it has been attempted several times. There certainly once existed a canal on the isthmus, for numerous traces of it still appear in several places; it did not however unite the two seas, but only the Red Sea with the river Nile. This canal was commenced when Egypt was an independent kingdom, under Nebo, nearly 3500 years ago, and was completed by Darius. (Herod. iv. 157.) When the French, under Bonaparte, had got possession of the country, they intended to give another direction to the commerce of Europe with India, by making a canal fit for large vessels across the isthmus; and accordingly they examined, with great care, the whole country between the two seas. A few miles north of the town of Tynieh, they encountered difficulties in the works on the land side, by a railroad, and a company was formed in England for that purpose, but little or no progress seems to have been made in the execution of this scheme. The country does not present invincible obstacles to such an enterprise, as the site which is proposed for the canal is well adapted for the works of the French engineers, clearly shows:

The whole tract, from Suez to Tynieh, is uninhabited, and, in its present state, is uninhabitable. Drinkable water occurs only in one or two places, but as water has hardly been desired by the French, they have been surprised to find that the parts which lie to the west of the isthmus, and at no great distance from it, this inconvenience could be remedied by a short aqueduct from the wells to the lines. It is very improbable that a canal could be made, owing to the want of water. The Red Sea is nearly thirty-three feet higher than the Mediterranean, and a canal would require locks; but the water of the whole isthmus would not be sufficient to feed one lock for a single day. A railway however could certainly be constructed there; there is the level of the two seas, and the whole line which deserves the name of a hill. The surface, in general, consists of sandstone, which in many places, by disintegration, has been converted into sand. The surface is not a level plain, but is interrupted by some mountains. The canal of Nebo had been made, and the French executed their levellings in the deepest part of it. By this levelling it was discovered that the depression, in nearly its whole extent, is lower than the level of the Red Sea. It is only a little more than sixty feet, between the harbour of Suez and the caravan-road leading from Cairo to Suez, a distance of 48 English miles, which is higher than the level of the Red Sea at spring-tides, and in no part more in seven feet, though generally much lower. The canal of Nebo must have been formed on this higher ground, and even where the country sinks below the level of the Red Sea such traces may be discovered as far as 30° 19' N. lat., where they are lost in the deeper depression, which is still filled by a lake, and for some miles the only water to be seen on the surface of their waters. Up to these lakes the direction of the depression is due north, or nearly so, but the lakes themselves turn to the north-west, and extend to 30° 30' N. lat. without interruption. The surface of the southern parts of the lakes is 64 English feet below the level of the Red Sea, which is 35 English feet lower than the level of the Red Sea at spring-tides, and 64 English feet below it. Not far from the northern extremity of the Bitter Lakes are the ruins of a temple of Serapia. The site of these ruins is less than two French miles below the level of the lakes, and some of these ruins is another depression, containing a small lake called Temshah, which is dry during the greater part of the year, but filled with water when the inundations of the Nile have attained their greatest height. The river reaches the lake by a steep descent, and which bears the name of El Wadi. It is very narrow near the lake, but widens in proceeding westward to nearly a quarter of a mile, until, in approaching the small lake called Berket-el-Serigeh, it reaches the inhabited parts of the delin, and then, for about two miles, sinks some thirty feet, and between the lakes of Tynieh and Temshah, where the depression, which in some parts is nearly twenty French feet below the level of the Red Sea, the canal of Nebo had been let, is as appears from the numerous traces which still exist. In proceeding northward of Lake Temshah, and at no great distance from it, the water sinks some fifteen feet, and the salt-marshes and the lake of Bellah is a similar stony country, of about the same elevation. The last-mentioned lake may be considered as the most southern branch of Lake Menzaleh, being united to it by low ground and marshes, which, during the inundations of the Nile, are covered with water. East of these two lakes is a stony
uneven tract, the surface of which never attains the elevation of the Red Sea, and this tract extends to 31° N. lat., where it joins the plain of Pelusium, which is nearly thirty feet below the spring-tides of the Red Sea, and about three feet above the level of the Mediterranean. The plain is a sandy ridge, with a sandy soil, almost entirely destitute of vegetation, and in many parts covered with a thin layer of salt. When the water attains its greatest height in the Nile, it is almost entirely inundated. At the eastern extremity of the plain is the small village of Tynub, and about a half a mile below it is a small break in the range of sandhills, which are supposed to be those of the ancient town of Pelusium. But no traces of the bed of that arm of the Nile, the Pel- sium, the name of which was derived from that town, can be discovered in any part of the plain. The country which extends to the west and south of the plain is a jumble of the horizontal strata of sandstone, and presents few inequalities, except towards the south, where, at the distance of about four miles from it, and south of 30° 20', are the extremities of the ridges, which lie between Cairo and Suez, and bear the names of Jebel Amed Taber, Jebel Ueybe, and Jebel Autad: an elevated hill, probably connected with Jebel Ueybe, occurs at a short distance from the western margin of the Bitter Lakes, and is the highest point of the island. The name which lies on the coast is a name of the story as far south as the south end of the Lake of Bollah on the north, and as far north as the caravan-road from Cairo to Suez on the south, but that part of the country which intervenes between these two points is entirely covered with sand.

SUEZ, a town situated at the head of the westernmost of the two arms or 'gulfs' in which the Red Sea terminates, is in 29° 57' 30" N. lat., 32° 31' 33" E. long., and 943 geographical miles east from Cairo. Suez is situated near the headland which extends to the north and the gulf, the shore of which here runs nearly from east to west, and the narrow arm which runs up northward from the eastern corner of the gulf. It is poorly walled on three sides, and open on the east, towards the harbour and a good quay. Within the walls are a great number of open places, and several khans built around large courts. The houses are in general poorly built. There is a bazaar, or street of shops, tolerably furnished with goods from Cairo. The town contains 10,000 Moslems and 100 Christians of the Greek church. The importance of Suez however arises from its position rather than its population, which can never be great. The transit of the productions and merchandise of the east from the Red Sea to the Nile has always been held of the greatest importance, caused by the existence of a city in the vicinity, though Suez itself as a town cannot be traced to an earlier origin than the early part of the sixteenth century. The concourse of pilgrims who annually embark here for Mecca has also rendered necessity the city. There is no reason for making it the point of communication between Europe and India, by means of steam-navigation on the Red Sea, may probably give an impulse to its prosperity and enlarge its power of exciting the mathematical consequences, of the useful kind of verdure and cultivation, it can never become more than a place of passage, which both the traveller and the inhabitant will hasten to leave as soon as possible.

(S. Robinson's Biblical Researches in Palestine; Niebuhr's Reisen mitgetheilt; Burckhardt's Travels in Syria, &c.)

SUFFRAGE. [Tenantry.]

SUFFICIENT REASON. (Mathematics and Physics.)

The principle which is connected with these words might be, and frequently is, called the 'principle of sufficient reason'; and which never appears to have been called, is the want of any possible amount of reason. Since however all that takes place must have a sufficient reason (whether we know it or not) for its happening, and everything which is asserted must be capable, if true, of being shown to have a sufficient reason, we are only taught by this principle that there is the want of any possible amount of reason. Since however all that takes place must have a sufficient reason (whether we know it or not) for its happening, and everything which is asserted must be capable, if true, of being shown to have a sufficient reason, it should be said that it is the want of any possible amount of reason in the sense of absolute want of reason, in all matters connected with the exact sciences. If A be equal to B, there must not only be reason, but reason enough for it: anything short of reason enough is no reason at all, and anything short of proof enough is no proof at all.

All the use of the word reason in the statement of this principle may itself be fairly objected to. We are in the habit of speaking of mathematical consequences in the same manner as of those to which the notion of cause and effect applies. When one proposition is made to subserve the proof of another, we call it the first one of the reasons of the second, just as we should say that the reason of a flood was the preceding heavy rain. But this mode of speaking must be objectionable if the word reason be used in the same sense as in the above-mentioned principle. For at liberty to deny the effect on denying that cause; if the rain had not fallen, the flood would not have taken place. But when we say that one mathematical proposition is the reason of another, in which position do we stand if we admit that the proposition is the reason of the conclusion? Do we believe that one is the reason of the other, and of persons who assert a contradiction of terms, and try to make rational consequences. Thus, the equality of the angles at the base of an isosceles triangle is one of the reasons (so called) why the tangent of a circle is at right angles to the radius through the vertex of the triangle, the first proposition, the necessity of which, when seen, helps us to see the necessity of the second and more complicated one. But the necessity of the first is not previous to that of the second, except in the order of our perception; when we follow Euclid. Suppose we were to say, if the angles at the base of the isosceles triangle had not been equal, what effect would that circumstance have had upon the position of the tangent of a circle? We might as well inquire what would have been the angle of the square? The case would be the same as that of inclosing a space? We remember a book of arithmetic in which it was gravely asked, by way of exercise for the student, 'If it had been the third part of 12, what would the quarter of 18 been?' a question which can only be answered by following the rule of some of the simpler propositions. Since at one and the same moment, how many other non-existences would therefore become existences?

Secondly, the term reason, in the sense of previous cause, is wrong as applied to mathematical propositions, because in this sense it can have no meaning. When it is said that something happens that the second, when granted, may be made to prove the first. Thus (Right Angles) of the two propositions, 'all right angles are equal,' and 'two lines which contain a right angle do in one and the same way, we must assume, and the other will then follow: but either may be the one assumed; the other will follow. Now it is absurd to say that of two things each is the previous cause of the other. The whole of this confusion may be remedied by saying that he who will remember that one proposition is not the cause of another, but it is our perception of the one which is made the instrument of bringing about our perception of the other. The constitution of our faculties is the previous cause of the necessity of mathematical propositions, but not the preceding cause. If we do not believe the necessity of this necessity our cognizance of the necessity of one is made the previous cause of that of the necessity of another. To say that B is the consequence of A, is only to say that our knowledge of the truth of B is the consequence of our knowledge of the truth of A.

Taking care to use the word reason in the sense just alluded to, we assume that whatever is necessary has a possibility of being shown to be necessary, and that whatever is true has a possibility of being shown to be true. Nor do we say that our knowledge of the truth of A is the consequence of our knowledge of the truth of B. We can, if we choose, be completely ignorant of all that may possibly be said for or against an assertion, as to affirm a necessary incapability of demonstration of one side or the other? Such cases are universally admitted by mathematicians to exist; and the final use of demonstration is to convince us that it is true. If proving a contradiction, is said to be made on the principle of the want of sufficient reason. But this very dangerous weapon is never put into the hands of a beginner, in mathematics at least. And when we see mathematicians assume it, we only state what is well known to every mathematical teacher, that a student who is allowed to proceed one step by this principle will soon ask permission to make it the universal solvent of difficulties, and will be ready to urge any inadmissible proposition to be taken to be false, in preference to seeking for or following the demonstration that it is true. A beginner can easily admit a sound use of this principle, but can hardly distinguish it from the thousand inaccurate applications which his ignorance will make, if it be left in his own hands.

But we can imagine we hear it said that this principle,

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though sometimes employed in pure physics, is never intro-
duced into mathematical reasoning except after direct de-
monstration, in order to confirm the mind of the learner by
making him see how difficult it would have been to imagine
the possibility of any method leading to anything but reluc-
tained against the proposition just proved. We believe in-
deed that this principle is seldom employed, and always
without necessity, so that we could wish its use were en-
tirely abandoned. But we can show that a tacit appeal to it
is often truly the chief of all the weapons that are really
employing it. If the principle be dangerous, and liable to
be uselessly employed, it should be most carefully stated
when it is used. Whenever we see a proposition assumed, not
as an express postulate, but in an example of some generality
of which two parts into one diameter divides a circle,
following immediately upon the definition of a circle; and
the definition of equal solids as those which are contained
by the same number of plane figures equal each to each.
Throughout the article. It may be, indeed, possible to
accept; but we will now point out a use of the principle
which exists in our elementary works of the present day in
an unacknowledged form.

In proving the celebrated proposition of Albert Girard relating to the areas of the area of a spherical triangle
upon the sum of its angles, it is assumed that two spherical
triangles which have their sides and angles equal, each to
each, are equal in area. Now it is easily shown [Sym-
metry] that there may be two such triangles of which it is
impossible to make each coincide with the other, not even by
the process ever given for dividing each into parts, so that
the parts of one may be capable of coinciding with those
of the other. Let the angular points of one be placed upon
the angular points of the other (which is always possible), and
the triangles, in our opinion, in common language, they
will bulge in different directions. When the triangles are
so placed, and the common chords drawn, there is no diffi-
culty in seeing that if ever a want of sufficient reason can
be greater than is here, the pivot of the proof is the identity
of the areas of the two triangles. And the equality of these
areas is accordingly assumed: for instance, in the propor-
tion above alluded to, a pair of unsymmetrically equal
triangles always occurs, except when the given triangle is
isosceles and the other right; but it is impossible to avoid;
for it is easy to make the given triangles into the sum or
difference of isosceles triangles, in which each of one set
is capable of being actually applied to one of the other.

Leaving the subject of pure mathematics, let us now con-
side the application of this principle in physics. We have
observed [Statics] that the line of separation between pure
mathematics and the more exact parts of mathematical
physics is very slight indeed: this means as to the clearness
and ease of the propositions and the rigour of the de-
monstrations. If we cut the link which makes the union
of statics and dynamics to the properties of the matter which
actually exists around us, we may go farther, and say that
we have not only pure sciences, but pure sciences in which
the principles of the sciences of sufficient reason are
so strictly inapplicable, because it is our own selves who have, by
express hypothesis, excluded sufficient reason. In propositions
of pure mathematics, we have seen that we cannot invent
or deny for any hypothetical purpose; is and must be,
irrelevant to be capable of bearing any weight in those
sciences teach. But the properties of matter which
are not also those of space, are not, in our conceptions, ne-
cessary: we can imagine them other than they are, without
any contradiction of ideas. We shall now proceed to con-
sider the application of this principle in the consideration of
the axioms of that science. Are they self-evidently true,
and not to be learnt from without, but from within?
a manner as to entitle them to the name of pure sciences, or some other which shall mark the real distinction between the natural sciences of matter, we cannot yet be of opinion that their partial causes are all derived from their own evidence, or obtainable from the sufficient-reason principle. There are however many points connected with this part of them which are difficult of exposition for want of acknowledged terms.

SUFFIX, a term lately employed in mathematical language to denote the indices which are written under letters, as in $a^n$, $a^0$, $a^6$, &c. Though these signs have been so long used, we never saw a distinctive name given to them before the publication of Professor Hall's Differential Calculus.

SUFFOLK, a maritime county of England, on the east coast. It is bounded on the north by the county of Norfolk, from which it is almost every part separated by the rivers Little Ouse, Waveney, and Yare, on the east by the German Ocean; on the south by the county of Essex, from which it is almost every part separated by the river Stour; and on the west by Cambridgeshire, from which it is, for a short distance, separated by the Lark, a feeder of the Great Ouse. The general form of the county approaches to that of a crescent, of which the whole of the concave side is conterminous with the county of Norfolk. The approximation to the crescent shape would be greater but for the elevation of the adjacent districts, which in a high state of water, the boundary forms an acute angle, and for a second projecting portion near Newmarket. The greatest length is from north-east to south-west, from Southtown, a suburb of Great Yarmouth, to the neighbourhood of Haverhill, 68 miles; the greatest breadth, which then rises in the direction of Felixstowe, from the bank of the Little Ouse, in the north-west corner of the county, to Landguard Fort, opposite Harwich, 52 miles. The area of the county is estimated at 1513 square miles, or, taking it as the aggregate of the lateral eyots, 918,760 acres; the population, at the last enumeration, from 1801 to 1841, was as follows:—1801, 210,431; 1811, 234,211, increase 11 per cent.; 1821, 270,542, increase 15 per cent.; 1831, 296,317, increase 9 per cent.; 1841, 315,125, increase 5 per cent. These circumstances enable us to facilitate comparison with other counties, in which we have employed it gave 196 inhabitants to a square mile. This county is in size the twelfth of English counties, being smaller than Cumberland, but larger than Sussex; in amount of population (1841) it was the seventeenth, its place being below Cornwall, but above Sussex; and in density of population the twenty-third, falling short of Monmouthshire, but exceeding Hampshire in this respect. There are two county-towns. Ipswich is 65 miles in a direct line from London, and 10 miles of the main road by the mail-road through Romford, Chelmsford, Witham, and Colchester; Bury St. Edmunds is 62 miles in a direct line, north-east by north, from the same point, or 14 miles by the mail-road through Newmarket, Stow-Market, and Ipswich. The county is included between 51° 55' and 52° 38'. N. lat., and 1° 46' E. long.

Surface; Coast-Line; Geography.—The surface of this county is gently undulating, except just along the north-western and some parts of the north-eastern border, where the land subsides into a marshy flat, secured from overflow only by embanking the course of the rivers. There are also some marshes bordering the rivers in the south-eastern part, but none of these are of any extent. There is not an eminence in the county more than 120 feet above the level of the sea. The coast line is determined by the course of the waters, forms a ridge of crescent-like shape, corresponding with that of the county, for the want of which it extends. It may be indicated by a line drawn from the neighbourhood of Lowestoft in the north-east, towards Harwich, the neighbourhood of Debenham; and from thence to the western border of the county, passing between Stowmarket and Ipsworth, between Bury and Lavenham, and between Newmarket and Cavendish, along the north coast of Great Yarmouth, from his line turns into the Waveney or the Ouse; while those who flow southward join the Stour, the Orwell, the Deben, or other streams flowing into the German Ocean. The coast has a tolerably regular outline, convex to the sea. The beds are shallow, and the headlands have little prominence. The maps notice three bays: Hollesley Bay, between the point at Bawsey, near the mouth of the Deben and Orford Ness; Aldeburgh or Aldborough Bay, between Orford Ness and the heathland near the village of Thorpe; and Southwold or Sole Bay, between Thorpe Point and Easton Ness, north of Southwell. This last has some historical interest as the scene of a severe but decisive conflict between the Dutch and English fleets (A.D. 1675). The headlands are the point on which Landguard Fort is placed, at the entrance of the stuary of the Orwell and the Stour, opposite Harwich; the point at Bawsey; Orford Ness, near Orford; the point near Thorpe, Easton Ness; and Lowestoft Ness, the most easterly point in Great Britain. The harbours are the stauries of the rivers Stour and Orwell, Deben, Butley or Alde, Blyth and Yare, and the artificial cut through lake Loting in the Waveney. The stuary of the Orwell is divided from that of the Stour by a barrier of marshes, which however do not in any part extend more than a quarter of a mile inland from the banks of those rivers, except just above Landguard Fort. The sea-shore from Landguard Fort is lined for about two miles with sand-hills, and from thence for two miles, nearly to the stuary of the Deben, by low cliffs of erag upon blue clay. Beyond the stuary of the Deben (which is skirted by a narrow line of marsh-land) cliffs of similar formation to those just mentioned recede, and extend nearly three miles to the point at Bawsey. The shore of Hollesley Bay, from the point at Bawsey to Orford Ness, eight miles, is low, lined as far as the stuary of the Butley or Alde with marshes, and north of that stuary by beach or shingle, which continues as far as the point of Aldeburgh, four miles, and separates from the sea the marshes formed by the Alde, which has the lower part of its course parallel to the coast-line, and very near it. From Aldeburgh the coast continues to be low for seven miles, and from there to the point of Dunwich is separated almost by sand. These cliffs extend about two miles to Dunwich, where the low shore recumbe, and extends four miles to Southwold. From Southwold, with two or three short exceptions, the coast is only separated from the sea by a thin covering for the most part of sand or chalk rubble covering gravel and red loam, extends eighteen or nineteen miles to the mouth of the Yare, where the coast of the county terminates. The whole length of the coast may be estimated at about fifty or sixty miles.

The greater part of the county is covered by diluvial beds. The exceptions are the erag and London clay district of the south-east, and the chalk district of the north-west. The erag and London clay district may be considered as bounded by a line drawn from Ipsley near Wivenhoe, to the banks of the Stour, between Sudbury and Nayland. The chalk is all found to the north-west of a line drawn from Eton, near Thorford, to Bury St. Edmunds, and from there west by south to the border of the county, and the chalk district is the only portion of the country* beneath the diluvial beds, or from beneath the sens which occupy the north-western extremity of the county. These diluvial beds vary in their character. In the centre of the county, between Ipswich and Bury St. Edmunds, the Stow-Market, and Diss (in Norfolk), on the east, they consist of beds of clay, with fragments of chalk. Eastward of this, beds of loam, with fragments of chalk, extend nearly to the shore, along which they are, in many parts, covered with sand, or gravel, or shingle, or chalk rubble. A similar loam is found bordering the clay on the west side for some distance, and extending south-west of Bury St. Edmunds to the very border of the county. Beyond this, between the Erag and London Loam, are found beds of sand, with or without flint gravel. The erag formation consists chiefly of thin layers of quartzose sand and comminuted shells, resting sometimes on chalk, sometimes on the London clay, and forming a local name for gravel. Close examination has led to the subdivision of this deposit into the red erag and the coralline erag, the former being uppermost when the two are found together. The red erag is at once distinguishable from the coralline erag by the reddish tint of the deposit of its sands and fossil fragments. The local name for the erag, amounting to upwards of 400 species, are some of them common to both divisions; others are peculiar to one division, and characteristic of it. These fossils bear a general and important analogy to those found in the northern seas, between lat. 50° and 60°; but whether any are identical with those now found in the adjacent (German) ocean is matter of dispute. Lyell refers the erag formations to the Older Fossiliferous period. The thickness of the erag is not
known: it has been penetrated 50 feet near Orford without reaching the bottom.

It is probable that the London clay occupies the whole district which we have assigned to it and the crafl; and that the latter covers it in that part of the district which lies north-east of the Orford River. The Crafl, which lies between the Orwell and the Stour is for the most part occupied by the London clay alone.

The chalk of the north-western side of the county does not extend to any great nearness of the coast. The formation appears to extend under the diluvial beds which occupy the centre of the county. (Conybeare and Phillips's Outlines of the Geology of England and Wales; Lyell's Elements of Geology.)

Suffolk produces scarcely any minerals of value. Clay and iron-mart from the crafl formation have been dug for manures.

Hydrography and Communications.—The Waveney and the Little Ouse, border rivers, which separate this county from Norfolk, and receive the drainage of the northern part, are described elsewhere [Norfolk, vol. xvi. p. 226-29]; where also the navigable cut from the sea, through lake Lothing, is described, though it belongs to Suffolk. The tributaries of the Waveney are all small. The longest, which may be estimated at about 30 miles, is navigable from Pinchbeck, and flows by the borough of Eye into the Waveney at Hoxne, is only 10 or 12 miles long. In that part of the county which is adjacent to the lower part of the course of the Waveney are several small sheets of water, as Oulton Broad and lake Lothing, through which no navigable cut passes, and which, together, are about two miles long from east to west; Breydon Water, above three miles long, just below the junction of the Waveney and the Yare, on the border of the county; Fritton decoy, a winding sheet above two miles long, and just below the former of the foregoing. None of these pieces of water have much breadth, except Breydon, and that, in its widest part, is not a mile across.

The Little Ouse receives only one stream which requires notice. It rises near Bradfield St. Clare, about five miles south-east of Haverhill, and flows by Essex and Suffolk to the Great Ouse at Attleborough, where it joins the Little Ouse. The depth of the river is here about six feet. The channel is narrow, and its width is not constant. These two rivers, however, vary in width according to the tide, which makes them navigable from Lynn to Sheerness.

The river Lark, a tributary of the Great Ouse, rises at Lawshall, five or six miles south of Bury St. Edmunds, and flows north-west, in a direct line, that which it receives a small stream called the Linnet, and then flows north-west, by Mildenhall, to the border of the county, which it skirts for a few miles, and then enters Cambridge-shire, where it joins the Great Ouse. Its whole length may be estimated at about 30 miles. It is navigable from Bury, and serves to convey produce from that town and neighbourhood to the river Ouse and the port of Lynn.

Of the streams which drain the southern part of the county, the Stour is the most important. It divides Suffolk from Essex, and flows by Ipswich and Fressingham, and flows by Ipswich and Euston park into the Little Ouse above Thetford. Its length may be estimated at 16 or 18 miles. The river Lark, a tributary of the Greater Ouse, rises at Lawshall, five or six miles south of Bury St. Edmunds, and flows north-west, in a direct line, that which it receives a small stream called the Linnet, and then flows north-west, by Mildenhall, to the border of the county, which it skirts for a few miles, and then enters Cambridge-shire, where it joins the Greater Ouse. Its whole length may be estimated at about 30 miles. It is navigable from Bury, and serves to convey produce from that town and neighbourhood to the river Ouse and the port of Lynn.

The Orwell, or Gipping, as it is called in the upper part of its course, is formed by the junction of several streams, which unite just by Stow-Market, and flows by Needham-Market to Ipswich. Below that town it expands into an extensive and very rich marshy tract of flats at Harwich with the estuary of the Stour. It is the estuary alone which bears the name of Orwell. The course of this river to Ipswich is above 20 miles, for more than half of which (viz. from Stow-Market) it is navigable: the estuary is 10 or 12 miles broad at Orford. The Abbas, and one of the greater cuts of that distance more than half a mile wide at high-water. Sea-borne vessels of considerable burden get up to Ipswich. Ipswich, antiently written Gipswich, Gipswic, Gipswich, and Ypewich, comparatively speaking, includes in its name the same element as the name Gipping.

The Debden rises near Debdenham, and flows about 20 miles in a winding course to Woodbridge, below which it becomes an estuary 9 or 10 miles long, and from a quarter to half a mile wide, navigable for sea-borne vessels of considerable burden.

The Alde rises near the village of Bradninch, and runs 11 miles south-east to its junction with the Ore, which rises near Framlingham, and has an eastward course of about 12 miles. From the junction the united stream, which is sometimes called Ore, sometimes Alde, flows about 15 miles in the sea. The course of this part of the river (which is the greatest part of its length, an estuary) is remarkable: about eight miles below the junction of the Alde and the Ore, near the town of Aldeburgh, it approaches within 200 yards of the sea; and then, suddenly rising, has the rest of its course in the sea. This river is bounded on the north by a long, narrow, marshy peninsula. The principal feeder of the Alde is the Butley, a small river, the lower part of which becomes a tolerably wide estuary, opening into the estuary of the Alde just before it joins the sea. The Alde is navigable to Snape Bridge, near the head of the tideway. The part below the junction of the Butley is sometimes called Butley.

The Blyth rises near Laxfield, and flows eastward 16 miles by the neighbourhood of Halesworth, from which town it receives a small feeder, into the sea near Southwold: it is navigable up to Halesworth, eight or nine miles.

There are no canals, but some of the smaller rivers have been made navigable.

The Norwich and Ipswich mail-road enters the county at Stratford Bridge over the Stour, between Colchester and Ipswich, and runs to Ipswich, and from thence northward by Stoke and Scle Bridge over the Waveney into the county of Norfolk. It is remarkable that this road does not pass through any part of the county of Suffolk. The distance from Norwich to Ipswich, a distance of 43 miles, though passing through a fertile and cultivated country. The Yarmouth mail-road branches from the Norwich road at Ipswich, and runs through Woodbridge, Saxmundham, and Lowestoft. A second Yarmouth mail-road branches from the Norwich road at Lowestoft, and runs through Saxmundham and Lowestoft, passes through Beccles, and rejoins the mail-road just before entering Yarmouth. The Norwich and Newmarket mail-road enters the county at Newmarket, runs eastward to Bury St. Edmunds, and then northward through Upton, Bury, and Newmarket, which, it is to be observed, are all -

Agricultural: Essex, and Suffolk is peculiarly interesting in an agricultural point of view; and, with the adjoining counties of Norfolk and Essex, it forms one of the best cultivated districts in the southern part of Great Britain.

The climate is much drier than that of the more western counties of England; but also colder in spring, when the north-easterly winds prevail. The only inconvenience arising from this is the occasional freezing of the turnips, when left on the ground; but the beneficial effects of a sharp dry air on the land, which has been ploughed up before winter, fully compensate for the occasional loss of turnips and the slow progress of early feed. The soil, although varying extremely, may be divided into three or four distinct kinds. The principal rich soil is found in a small portion of the southern part of the county, between the Orwell and the Stour, both of which rivers form estuaries at their junction with the sea at Harwich. This loam is not so compact as clay, nor so loose as sand, but contains a great proportion of organic matter, which helps to ensure its fertility. The rich soil is found in the whole of the centre of the county, from the Stour to the borders of Norfolk, and is computed at 450,000 acres, being nearly half the surface of the whole county. Between the strong loam and the sea is a small running from the north bank of the river Orwell to Yar-
mouth, diminishing in breadth as it stretches northward, and consisting chiefly of sand of various qualities, incumbent on a subsoil of crag, which is a loose rocky substance, composed of sand, gravel, and broken shells, partly consolidated into a kind of stone. Some of this sand is poor, and suffers from hollow and out of use, enriched by organic matter intimately mixed with it: this is excellent for roots, especially carrots, and bears very fine barley. In the portions which lie low, and which have at some time or other been covered with water, a very rich grass has grown; the spontaneous produce of many acres may be desired. These rich portions however are few in comparison to the whole tract, which altogether contains about 150,000 acres. There is another tract of sand of a much inferior quality on the eastern extremity of the county, extending from Bury St. Edmunds, in which, are better lands interspersed. This lies chiefly on a chalk bottom, and is scarcely thought worth cultivating. Where it has been improved, so as to become productive, it has been done at the expense of great manure, and the result is not very great. There may be in this district about 100,000 acres of this poor sand, with 10,000 of a better quality. The last class consists of the fen-lands, which, when properly drained, become valuable; but in their natural state, soaked in water, they have little value. The extent of fen is estimated at 30,000 acres.

The system of tillage is very uniform throughout the county. The greater part of the land is under the plough. There is now scarcely a thing to be seen as a common field, or a piece of land which would be left unmanured. The mode of cultivation by the absurd rules and restrictions as to cropping which were established in consequence of the joint and several rights over the land, which no longer exist since the common fields have been divided and enclosed. The greater part of the croppers are now turned into pastures, and pasturing these land, and giving it the full benefit of the alternations of rain and frost which mark the variable climate of Great Britain and Ireland, is adopted on all kinds of soils. Wherever turnips can be profitably raised, and safely fed off with sheep, they are, with manure, very strong and adhesive for turnips, and where sheep would do harm by their treading, and where the carts and horses would do equal damage in taking them off, a fallow is substituted: these last century must have been fallow preparatory to a crop of wheat, but it is the long fallow, in which the land is exposed to the influence of two winters. Barley and clover are sown in the spring of the second year, to be succeeded by wheat and beans. This long fallow has been mentioned before. (Essex, Suffolk, Norfolk, and Cambridgeshire) which ploughed in the year, or the year before, was not approved of, it was left to come in for barley with the lighter lands which had borne turnips. Much to the surprise of those who first adopted this plan, almost from necessity, they found that their barley was much more abundant and of a better quality than the long fallow, with manure, thia than upon those fields which had borne turnips, and on which sheep had been folded. Nothing was lost therefore but the value of the turnips when fed off, which in many years is trifling. The clover ley being manured in the succeeeing year, and every year, and the land turned over the third year, and in this manner it is generally kept upon. Thus three valuable crops were reaped in four years, barley, clover, and wheat; and, where the land was in good heart, a crop of beans could be obtained, without risk, either after the clover or after the wheat, usually the latter before another fallow, giving four crops in the four years. We are not aware that this mode of cropping stiff clay-lands is adopted in any part of England, except the three counties of Essex, Suffolk, and Norfolk, and perhaps in a part of Cambridgeshire, adhering to the same system of cropping. Where the land is of a light nature, or has been left uncultivated for years, we have adopted it have found their advantage in continuing the long fallow on stubborn clays. On turnip land the four-course shift, as it is called, is universal, with some deviation as to the recurrence of clover every fourth year, a portion of the land being laid down with grass-seeds or Italian rye-grass, or planted with beans or peas, according to the nature of the soil. The simple Norfolk rotation is however on the whole the most profitable, and by means of deep ploughing, which is but partially introduced, clover is found to succeed for a considerable period every fourth year. When any deficiency appears, recourse must be had to some substitute, so as to defer it to every sixth or eighth year. The subsoil plough is of great assistance in securing a crop of clover.

There is no part of England where the implements of husbandry are more perfect than in this county. Guidelines are tried with more readiness and with less prejudice. This is owing in a great measure to the very excellent manufacturers of agricultural implements who live in the county. The competition among these men, many of the best, tends to a great degree towards the elimination of every defect, and ingenuity is stretched to make improvements both on the form and the durability of implements. The ploughs almost universally used, whether with or without wheels, are of cast-iron, except the beam and the wheel; each of the different materials is made as cheap as possible, and with extreme care, to moderate expense, being cast on one pattern and attached with nuts and screws. The wheel-ploughs are preferred by the ploughmen, because they require less attention and are held to be a safety to hold a wheel-plough who would make but sorry work with the best swing-plough. The question of comparative draft, which is at this moment in dispute between the Royal Agricultural Society and the Highland Society of Scotland, it would be presumptuous to attempt to decide; but it may be said that the wheels are convenient and save labour both to man and horse, while in others a good swing-plough in the hand of a skilful ploughman will plough a greater variety of land in a more complete manner, without any distress to the horses. The improvements in the construction of the plough, and the use of improved instruments which are in use in a large Suffolk farm: it would comprise a complete catalogue of scuffers, scarifiers, rollers, and harrows, which assist the plough in preparing the land; of drilling-machines to deposit the wheat; of three-ear, or three-bitted, harrows for the plough, to prepare the grain for the market; of machines for cutting roots or straw, or bruising oil-cake for cattle, or bones for manuring the land. Nowhere is so great a variation of farming machinery used for saving and manuring the land.

Of the many farms-buildings which have been erected of late years are not only commodious, but splendid. On the older farms there may be some deficiency, but the habitation of the farmers in general are such as many squire of the last century would not think fit to live in; many in fact are old mansions. The barns are no longer so large or so numerous as they used to be before the mode of stacking corn out of doors was so generally adopted. Where a threshing-machine is erected, a single floor is sufficient for a large farm; and if the yard be found the crop a time, there is storage enough for corn. The yards, on the other hand, are much increased and better arranged; where there is not sufficient shelter by walls and sheds, this is supplied by what are called hail-smalls. The stubbles which are not stacked off the land before the last farmer has left it, are stacked in the yard in such a manner as to enclose a space, leaving an opening only sufficient to admit a loaded wago. A small square is thus enclosed, and the cattle are sheltered from cold winds. The wall is made ten or twelve feet high, and ten or twelve feet wide at the bottom. This great width is necessary to resist high winds and the rubbing of the cattle. The top is roughly thatched. When, by the rubbing of the cattle and the decay of the stubble, the wall becomes loose and unsteady, it is taken down, and if the stubble is found in the yard it is stacked. These halm-smalls last several years. Nowhere are stacks of corn more neatly built than in Suffolk. As many as are intended to be kept for any length of time are built on frames, called studlar, and on each pillar about eighteen inches from the ground, with flat cap above the pillars to prevent the access of rats and mice. The sides of the stacks are cut smooth by a sharp knife, such as is used for cutting husses of hay, and thus the depreation of birds are prevented. The bales or sheaves of corn are generally on the ground in a dry spot, it is protected by a slight coat of thatch all round ground to the ground. This is fixed by means of rods and pins, and protects the outer layer of barley. It is thus not only preserved from birds, but also from the effects of the weather. When the barley has none of those discoloured grains which deteriorate the value, but is equally clear and bright with the interior of the stack, if the barley has not been hurt in the field.

The practice of dibbling corn by hand is adopted, as far as the number of hands permit; but on a large farm it is
too slow an operation; the drill is therefore generally used, which will in one day sow ten acres of land. Machines for dibbling have been invented, and no less than four patents have been obtained lately for such inventions [Sowing Machines], but they have not yet been sufficiently tested by experience to be generally adopted.

Suffolk has but one breed of cattle which is peculiar to it. It is a polled breed, in which the corns or horns are present at birth, and justly so. It is supposed that this breed has some relation to the Galloway and Aberdeen polled breeds; but this is mere conjecture. The cows are usually of a light red, sometimes spotted with white, of moderate size, and excellent milkers; they have not been attended to as much as the bull-calves are fattened for the butchers or sent towards Essex and London for that purpose. Their aptitude to fatten has seldom been noticed; but the Suffolk cows, when barren, fatten with surprising rapidity. They give 30 quarts of milk per day, and of a good quality, for a considerable time after calving; but this is, no doubt, an extraordinary instance. Twenty quarts per day for three months is by no means uncommon, and sixteen may be considered as an average. This will be seven pints of butter, twenty ounces to the pint, per week—no bad produce.

The Suffolk farm-horses are noted for their docility, steadiness, and unwaried perseverance against a dead pull. In former days it was not unusual in fairs and markets to hook the tresses of their heads in a ring fastened to the ground. If the horse pulled till he went down on his knees, he was staunch; but if he ever refused his utmost exertions, he was despised. No better mode could be invented to spoil a good horse. The Suffolk horses are active in their walk, which is their best pace. It is not easy for a man to keep pace with a Suffolk horse walking along the road. They step out well, and some of them can go at the rate of three miles an hour drawing a plough, and to this owes the unquestionable superiority of ploughing in the lands of Suffolk and Norfolk. The usual mode is, as in Scotland, in two yoking, resting two or three hours between, in summer. The defect of the Suffolk horses, if it be any for a farm-horse, is to have rather coarse hoofs and very wiry shanks. They are excellent for thoroughbred and excellent proportions; and many a Suffolk mare has been put to a thorough-bred horse, and produced very fine foals for the carriage or the chase. But those who would try this cross should be very careful to select mares with fine heads, good shoulders, and not a falling gait. In spite of all precautions, the old points will come out, and occasionally spoil a very promising foal, even at the third or fourth generation.

Suffolk pigs are perhaps, on the whole, the most profitable breed of pork in England. They are well-shaped, short-legged, mostly white, with short upright ears, and the porkers of this breed are excellent. It may be distinguished from the Essex breed by being better covered with hair, and from the Norfolk by having smaller ears set more nearly together. It is entirely a cross of the Shropshire and another animal, perhaps a pig; but while the Essex have evidently much Neapolitan blood, the Suffolk seem to have more Chinese. Both crosses being excellent, it is useless to dispute the pre-emminence. The Suffolk pig is not so delicate in constitution as the Essex, and is therefore decidedly the best poor man's pig.

Suffolk has no indigenous breed of sheep; the Southdown and a cross of this breed with the Leicester and Cotswold are very common. The cross between the Southdown and Dorset is in increasing reputation. The horns of the Norfolk sheep and his rambling propensities have been changed, and a quiet polled breed is the result. They are well shaped; and the mutton, if old enough, is excellent. They are getting more and more into favour.

Suffolk has the following—Newmarket, quarterly; Ipswich, Market, weekly; Bury St. Edmunds, Tues., in Easter week and two following, Oct. 2. Dec. 1; Clare, Tues., in Easter week, July 26; Debenham, June 24, Aug. 8; Eye, May 30; Framlingham, White Mind, Oct. 10; Hadleigh, Tues., in White week, Oct. 10; Halesworth, Oct. 29; Lowestoft, May 12, Aug. 26; Ipswich, May 4, Aug. 26, Sept. 15; Lowestoft, May 13; Lavenham, Oct. 10, for four days; Shrove Tues.; Long Melford, Tues., in White week; Lowestofe, May 12, Oct. 19; Mendip, in Oct. 2; Milden Hall, Oct. 11; Nayland, t. 2; Needham-Market, Oct. 28 and two following; Orford, Midsummer, Shrove Tues., Saxmundham, White week, and three following, Oct. 10; Southwold, in White week, July 10, Aug. 12, Oct. 1; Sudbury, July 10, Sept. 4; Woodbridge, April 6.

The county is divided into twenty-five as follows, besides the liberty of the borough of

<table>
<thead>
<tr>
<th>Hundred</th>
<th>Situation</th>
<th>Acres</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babergh</td>
<td>SW.</td>
<td>105,580</td>
<td>24,972</td>
</tr>
<tr>
<td>Blackheath</td>
<td>N.</td>
<td>87,370</td>
<td>14,427</td>
</tr>
<tr>
<td>Blything</td>
<td>E.</td>
<td>83,850</td>
<td>24,177</td>
</tr>
<tr>
<td>Bosmere &amp; Claydon</td>
<td>Central</td>
<td>50,640</td>
<td>12,956</td>
</tr>
<tr>
<td>Carleton</td>
<td>do.</td>
<td>22,550</td>
<td>6,348</td>
</tr>
<tr>
<td>Colneis</td>
<td>SE.</td>
<td>17,460</td>
<td>4,369</td>
</tr>
<tr>
<td>Cosford</td>
<td>Central</td>
<td>30,600</td>
<td>10,489</td>
</tr>
<tr>
<td>Hartismere</td>
<td>N.</td>
<td>55,240</td>
<td>17,815</td>
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<tr>
<td>Horr</td>
<td>N.</td>
<td>53,070</td>
<td>15,309</td>
</tr>
<tr>
<td>Ipswich (liberty)</td>
<td>SE.</td>
<td>7,020</td>
<td>20,201</td>
</tr>
<tr>
<td>Lackford</td>
<td>NW.</td>
<td>79,800</td>
<td>13,109</td>
</tr>
<tr>
<td>Looe</td>
<td>Central</td>
<td>32,590</td>
<td>13,544</td>
</tr>
<tr>
<td>Mutford and Lothingland</td>
<td>NE.</td>
<td>32,960</td>
<td>13,355</td>
</tr>
<tr>
<td>Plomesgate</td>
<td>E.</td>
<td>41,390</td>
<td>11,285</td>
</tr>
<tr>
<td>Risbridge</td>
<td>W.</td>
<td>56,190</td>
<td>16,215</td>
</tr>
<tr>
<td>Saxon</td>
<td>B.</td>
<td>44,650</td>
<td>11,242</td>
</tr>
<tr>
<td>Stow</td>
<td>Central</td>
<td>22,010</td>
<td>8,308</td>
</tr>
<tr>
<td>Thetford</td>
<td>do.</td>
<td>38,890</td>
<td>10,193</td>
</tr>
<tr>
<td>Thingoe</td>
<td>do.</td>
<td>34,890</td>
<td>7,458</td>
</tr>
<tr>
<td>Thredling</td>
<td>do.</td>
<td>7,650</td>
<td>3,228</td>
</tr>
<tr>
<td>Welford</td>
<td>N.</td>
<td>25,540</td>
<td>13,605</td>
</tr>
<tr>
<td>Wilford</td>
<td>SE.</td>
<td>30,180</td>
<td>7,433</td>
</tr>
</tbody>
</table>

Total | 918,760 | 296,317 |

The boroughs of Bury St. Edmunds and Sudbury are included respectively in Thingoe and Babergh hundreds.

Suffolk contains the two county and borough towns of Ipswich and Bury St. Edmunds, the parliamentary boroughs of Eye, Halstead, and Sudbury, the market towns of Blything, Bungay, Langley, Defenham, Framlingham, Hadleigh, Halesworth, Lavenham, Lowestoe, Mildenhall, Newmarket, Saxmundham, Southwold, Stowmarket, and Woodbridge; with the ex-market towns of Billesdon, Blythburgh, Botesdale, Brandon, Haverhill, Ixworth, Mendlesham, Needham-Market, Neyland, and Woolpit. Some of these are noticed elsewhere. [ALD- BOROUGH OF ECCLES—BELCHING—NEWMARKETS—IPSWICH; NEWMARKET.] Of the rest we subjoin an account.

Sudbury, in the Suffolk, the Saxon chronicist Suth-beri, is in the hundred of Babergh, on the road from London to Bury, between 15 and 16 miles south of the latter town. It was a centre of the woolen manufacture by the Flemings, in the reign of Edward III. Simon of Sudbury, archbishop of Canterbury, who was beheaded by Wat Tyler's mob, A.D. 1381, founded here a college of priests, whose yearly revenues at the dissolution were £222, £82, 3d. There were also a house of Dominican or Black Friars, a Benedictine cell to Westminster Abbey, and an hospital. The head and body of the archbishop Simon of Sudbury were buried in the church of St. Gregory in the town; and the head, dried by art, was shown as late as the middle of the last century. The borough comprehends three parishes, All Saints, St. Gregory, and St. Peter; these have an area of 1230 acres; the population in 1831, was 4677. By the Boundary Act, the township of Balingdon-cum-Brunedon (in Hanford hundred, in Essex, area 730 acres, population in 1831, 823), and some small extraparochial districts, were added to the borough for parliamentary purposes, and it is limited in extent as it has been adopted for municipal purposes also. The town consists of several streets, irregularly laid out; it is neat, clean, well-built place; the streets are paved, with flagged footpaths, and lighted. Many new houses have been built, and the town has been altogether more improved than Bunglingham has one street, forming a suburb of Sudbury, with which it is united by a bridge over the Stour. The three churches are mostly of perpendicular character; they have all been fine churches, but some of the tracery and other parts have
been much mutilated. The Independents have a meeting-house.

The town-hall is a modern building, and there is a neat theatre. The principal manufacture is of silk. By means of the Stour, which is navigable nearly up to the town for barges, trade is carried on in coals, which are imported, and in agricultural produce, which is exported. The navigation however is very bad. The market is on Saturday, and there is beside a corn-market on Thursday; there are two yearly fairs.

According to the census of 1831, 259 men in the borough and 5 men in Bellington, together 274 men, were employed in banking and insurance. Two men were, with a number of others, adherent to a church of All Saints, which is a vicarage, of the clear yearly value of 119l., with a glebe-house; the perpetual curacies of St. Gregory and St. Peter are united; their joint yearly value is 160l., with a glebe-house. They are in the rural deanery and archdeaconry of Suffolk and diocese of Ely. There were, in the borough, in 1833, eight day-schools, of all kinds, with 365 children, viz. 232 boys, 117 girls, and 16 children of sex not stated; and two Sunday-schools, with 233 children, viz. 141 boys, 52 girls, and 40 children of sex not stated. Sudbury was incorporated by charter of Queen Mary, A.D. 1554. By the Municipal Reform Act it has 4 aldermen and 12 councillors, with a court of assistants. The corporation has been maintained chiefly for parliamentary purposes, and, as the borough was disfranchised by the Reform Act, will probably go to decay. It has a revenue of about 150l. a-year, and is untouched by the Municipal Reform Act. The aldermen and councillors are elected by the burgesses, and are assisted by a number of assistants, or magistrates, and an Admiralty Court occasionally. The living of Dunwich is a perpetual curacy, of the clear yearly value of 40l., in the rural deanery of Dunwich, in the archdeaconry of Suffolk, and diocese of Norwich. The only school in the borough in 1833 was a Sunday-school, containing from 30 to 40 children, about half of each sex.

Orford is in Plomesgate hundred, 21 miles from Ipswich through Woodbridge. There was a royal castle here in the reign of Henry III., who granted a charter to the town, which was previously a borough by prescription. It is now, like Dunwich, a mere village; the market has been given up; and as the borough was disfranchised by the Reform Act, the corporation, which was kept up for parliamentary purposes, has been abolished by the Municipal Reform Act. It has an income of less than 100l., and its jurisdiction is growing into disuse. The area of the borough and chancery of Orford, including the adjacent hamlets of Gedgrave, is 2740 acres: the population in 1831 was 1302, and in 1833, reduced by the irregularly laid out, on the north-east bank of the river Alde or Ore, which is navigable. The church, when entire, was a large building: the nave alone is now used, and is separated by a wall at the east end of it from the chancel, which is more ancient, and has been allowed to fall to ruin. There are some curious portions in the nave. The ruins of the chancel are of Norman architecture: the piers are much varied, and some of them of singular shape. There is a curious font. Only the keep of the castle remained, it is a polygon of eighteen sides, with walls 90 feet high, and has three square towers in its circuit, which overtop the rest of the building. The architecture is Norman. Not far from the town, on the sea-shore near Orford Ness, are two light-houses. The town has a church of St. Peter, parochial and deanery of Sandown, and the benefice is united with the rectory of that parish; they are in the rural deanery of Orford, archdeaconry of Suffolk, and diocese of Norwich: their joint clear yearly value is 577l., with a glebe-house. There are 15 schools of all sorts (chiefly dame-schools) with 252 children; and two Sunday-schools, with 316 children, viz. 146 boys and 170 girls. There is a lending library for the use of the borough and of Dunwich. Orford gives the title of earl to the Walpole family.

Clare is in Rischbridge hundred, 18 miles south-south-west from Bury. The area of the parish is 3410 acres. The population of the parish in 1831 was 1619, from one-third to one-half agricultural. The town is on the north bank of
The river Stour. The streets are wide, but not paved or lighted, and the houses generally are of mean appearance. The church, which is in the centre of the town, is a fine large building; it has a handsome octagonal font of perpendicular character, and a brass, or a brass plate, of a pedestal, with the wings expanded, forming the reading-desk. There are places of worship for Baptists and Independents. On the south side of the town are the vestiges of an old castle; the site may be traced, and it appears to have comprehended an area of 11 acres. The mound on which the castle stood, and some fragments of the walls of the keep, yet remain. Near the ruins of the castle are the remains of a priory of regular canons of St. Augustine; part of the buildings are occupied as a dwelling, and the chapel, with various monastic works, is still used. Part of Clare gave name to an illustrious family, and the titles of earl of Clare and duke of Clarence were derived from it. There is a weekly market, and there are two small yearly fairs. The living is a vicarage in the rural deanery of Clare, in the archdeaconry of Suffolk, and diocese of Ely, of the clear yearly value of 15l., with a glebe-house. There were in the parish, in 1833, twelve day-schools of all kinds, with 263 children, viz. 116 boys and 149 girls; and three Sunday-schools, with 310 children, viz. 143 boys and 167 girls.

Debenham is in the hundred of Thredling, 13 miles north of Ipswich, on the river Deben, here a mere brook. The area of the parish is 1920 acres. The population in 1831 was 1629, about half agricultural. From its situation on a chalky surface, but not being very clean, but being a very fine soil, it is still largely cultivated. The church is a handsome edifice, and the market-house is a tolerably good building. There is a place of worship for Independents. The market, which is on Friday, is still an early fair.

The castle, which is a ruinous remains, is in the rural deanery of Cleydon, the archdeaconry of Suffolk, and the diocese of Norwich, of the clear yearly value of 15l., with a glebe-house. There were in the parish, in 1833, three-day schools, with 133 children, viz. 64 boys and 69 girls; and two Sunday-schools, with 82 children, viz. 48 boys, 67 girls, and 132 children of sex not stated. One of the day-schools has an endowment.

Framlingham is in the hundred of Loes, 18 miles north-north-east of Ipswich. It was probably a place of consequence in the Anglo-Saxon period, and of Saxmundham, which is on the east of it, was called, A.D. 870. In the middle ages it was important from its strong castle, granted by Henry I. to Hugh Bigod, and at different times held by the Bigods, the Mowbrays, the Howards, and other illustrious families. Sir Robert Hitcham, having purchased the castle and manor of the Howard family, bequeathed them for pious uses to the master and fellows of Pembroke Hall, Cambridge, by which society they were ultimately conveyed. The parish is 4470 acres; the population in 1831 was 2445, about two-fifths agricultural. The town stands near the head of the river Ore, which just to the north of the town expands into a spacious pond or mere. The streets are irregularly laid out, yet is the whole space divided into various fair and spacious building lots. The houses are, or were, all built and repitable. The streets are lighted with oil. The church is in the middle of the town; it is large and handsome, built of black flint, with a tower 96 feet high, in which is a peal of eight bells. The roof of the nave is of curiously carved oak; and in the church are several monuments of the Howards (among them those of Thomas, second duke of Norfolk, and his son the accomplished earl of Surrey, beheaded, 1547), and the names of Sir John and Sir Edmund Bigod, and the Earl of Norfolk. The former of these monuments was formerly a mere edifice, but is now restored. The living is a rectory, in the gift of the archbishop of Canterbury, of the clear yearly value of 929l., with a glebe-house. There were in the parish, in 1833, six day-schools, with 132 scholars, viz. 70 boys, 32 girls, and 40 children of other kinds (viz. 12 boys and 28 girls); and two Sunday-schools, with 172 children, viz. 56 boys and 116 girls, of which no return was made; two day and Sunday national schools, with 213 children (90 boys and 123 girls) in the week, and 262 children (121 boys and 141 girls) on Sundays; and one Sunday-school, with 210 children, viz. 90 boys and 120 girls. One of the day-schools has three small endowments.

Halesworth is in the hundred of Blything, 31 miles north-east of Ipswich, on Woodbridge and Saxmundham. The area of the parish is 1070 acres; the population, in 1831, was 2473, one-fifth agricultural. The town is irregularly laid out, and has a small stream running through it. It lies Blyth half a mile south-east of the town. The streets are wide, but not paved; and some of the houses are well built. The town is lighted with oil. The church is a handsome Gothic building; and there are remains of the former church of the Howards, which are of some interest. The church contains a monument of the Lord and Master of the Foundation of the College of God. There are some large almshouses, and a considerable trade in malting is carried on. The river Blyth and its branch are made navigable up to the town, and afford facilities for the export of corn, coal, lime, and general merchandise. There is a corn and general market on Thursday, and there is also a fair there.

The living is a rectory united with the vicarage of Coeddon, in the rural deanery of Dunwich, the archdeaconry of Suffolk, and the diocese of Norwich, of the joint clear yearly value of 430l., with a glebe-house. There were in the parish, in 1833, an infant-school, with 40 children, chiefly...
girls, supported by voluntary contributions; eleven day-schools, with from 267 to 257 children, viz. 117 boys, 120 girls, and from 30 to 50 children of sex not stated; one day and Sunday national school, with 200 children, an equal number of each sex; and one Sunday-school, with 110 children of both sexes. There were also an evening school and a lending library.

Lavenham (colloquially shortened to Lanham) is in the hundred of Babergh, 16 miles south-south-east of Bury. The town was a market-town and a parliamentary borough in 1831 of 2167, about one-third agricultural. It is in a healthy situation on the declivity of a hill, at the foot of which flows the little river Brei. It is irregularly laid out, the houses are mean, and the streets are neither paved nor lighted with lamps. The church is the third smallest in the diocese of Ely, and the clear yearly value of £423s., with a glebe-house. There were in the parish, in 1833, six day-schools, with 125 children, viz. 72 boys and 53 girls. There was an area of 1300 acres of arable land, 156 feet long, 68 feet wide, and has a steeple 141 feet high. The character of the architecture is perpendicular, the clerestory is lofty, and the tower fine, with bold buttresses. The church is surrounded in part by almshouses. The roof is curiously carved; the windows are numerous, and some of them are still embellished with painted glass; and there are one or two remarkable monuments. There are meeting-houses for Independents and Wesleyans, and there are several almshouses besides the church. The town is a rectorcy, in the rural deanery and archdeaconry of Sudbury, and the diocese of Ely, of the clear yearly value of £423s., with a glebe-house. There are in the parish, in 1833, six day-schools, with 125 children, viz. 72 boys and 53 girls. There was an area of 1300 acres of arable land, 156 feet long, 68 feet wide, and has a steeple 141 feet high. The character of the architecture is perpendicular, the clerestory is lofty, and the tower fine, with bold buttresses. The church is surrounded in part by almshouses. The roof is curiously carved; the windows are numerous, and some of them are still embellished with painted glass; and there are one or two remarkable monuments. 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The town is a rectorcy, in the rural deanery and archdeaconry of Sudbury, and the diocese of Ely, of the clear yearly value of £423s., with a glebe-house.
1669, the town was nearly consumed by a fire, which destroyed the town-hall, the market-house, the prison; besides granaries, four large houses, about three hundred and thirty houses; beside fahhouses, malthouses, brewhouses, and other outbuildings; and a great quantity of corn, merchandise, fishing-nets, and other tackle. The damage was estimated at more than 40,000£, and above three hundred families were ruined; but the town was so entirely rebuilt that the prosperity which it enjoyed before this calamity. The area of the borough and parish (which are coincident) is 680 acres: the population, in 1831, was 1675, scarcely any part agricultural. The town is on a hill, forming a little basin on one side, and on the other side, into the marshes through which the river Blyth, and an arm of it called the Buss Creek, flow. By these waters the hill on which the town stands is almost insulated. The only entrance to it is through the churchyard, by a bridge over the Buss Creek; and the main street is on the road from this bridge to the face of the cliff: it has flagged footpaths, and is lined near the sea with respectable houses; but in other parts the houses are of inferior character. The town and sides of the hill round the town are unenclosed land, chiefly or wholly common; and there are two windmills and a lime-kiln. The church is near the entrance of the town, on the north-west side, and is a large and handsome building of perpendicular architecture, mostly of flint, and 100 feet long, and 56 feet wide. The western tower is about 100 feet high; and there are two low hexagonal towers at each angle of the eastern end of the church. There is a highly ornamented porch, of some years' standing; and the interior of the church has been richly ornamented, but has been much defaced: the painted ceiling of the chancel still remains, and the mausoleums are adorned with gilding and painting. There are meeting-houses for Baptists, Methodists, and Independents. The town-hall is a modern building, and there is a small park. The principal branch of industry is the fishery, which, in 1831, employed one hundred men: there are some salt-works. Red herrings, red sprats, saley, corn, and malt are exported; and coal is imported. The principal vessels are fishing vessels, engaged by visitors from the adjacent counties. The quay is on the Blyth, above half a mile south-west of the town. The Municipal Reform Act assigns to the borough four aldermen and twelve councillors: it is not to have a commission of the peace except on petition and grant. The corporation revenue, derived chiefly from common, marsh, and other lands, is about 800£ or 900£ a year. The living is a perpetual curacy, in the rural deanery of Dunwich, the archdeaconry of Suffolk, and the diocese of Norwich. The clear yearly value of 60£, with a glebe-house. There were in the parish, in 1833, nine day-schools of all sorts, with from 193 to 213 children, namely, 82 boys, 80 girls, and from 30 to 50 children of sex not stated, and three Sunday schools, with 116 children, namely, 77 boys and 39 girls. One of the day-schools had an evening class of 10 adults. Stow-Market is in the hundred of Stow, 12 miles north-west of Ipswich, on the road to Bury, from which it is distant 14 miles east-south-east. The parish has an area of 1240 acres: the population, in 1831, was 2675, about one-sixth agricultural. The town consists of one main street along the Bury and Ipswich road, and of some smaller ones; the streets are for the most part paved, and lined with tolerably good houses; indeed several of the houses are very good, and the town is lighted with gas. The church is spacious and handsome, built of flint and stone: the architecture is partly decorated, partly perpendicular. The tower, which contains five bells, is surmounted with a light and elegant wooden spire, the steeple of which is 120 feet high. There are places of worship for Baptists and Independents. There is a small manufacture of rope, twine, and sacking; an iron-foundry; and a great number of malt-houses. Next to Cornhill, which is the principal church for Sunday services and marriages, there is an agreeable walk. There is a well-supplied corn, cattle, and general market on Thursday; and there are three yearly fairs. The living is a vicarage united with the adjacent vicarage of Stow Uphall, in the rural deanery of Stow, the archdeaconry of Suffolk, and the diocese of Nor- wich: their joint clear yearly value is 2814£, with a glebe-house. There were in the parish, in 1833, seventeen day-schools, attended by 206 children; one day and Sunday national school, with 64 boys and 42 girls, together 106 children; and two Sunday-schools, with 141 boys and 139 girls, together 280 children.

Woodbridge is in the hundred of Loss, on the river Deben, 7 miles north of Ipswich, and about 9 miles from Yarmouth. The area of the parish is 1560 acres: the population, in 1831, was 4769, scarcely any part of it agricultural. The town stands on the north-west bank of the river, which, at high water, is about 100 yards wide, and has a fall on one side of a mile wide, is surrounded by a belt of nobler houses: the principal streets (one of them near a mile long), which contain many good houses and are well paved; and of several smaller streets and lanes. The market-place is spacious, and surrounded with well-built houses: in the centre of it is an octagonal market-cross. The main street, which runs across the division are held: the lower part of the hall is the corn-market. The church is large and handsome, built chiefly of black flint: it has a large square tower, built of flint and stone, 100 feet high: towards the top the flint and stone are so intermingled as to form various devices. In the church are several monuments. There are places of worship for Quakers, Independents, Baptists, and Methodists. There is a custom-house, a small theatre and barracks. Woodbridge is a place of considerable trade: it is a port, and the river is navigable for small coasting vessels: the tide flows above the town. Corn, malt, and flour are exported; and coal, timber, and general merchandise imported. There are a few large manufacturing works, and several small flax and hemp manufactures. There were in the parish, in 1831, six school-houses, with 40 boys and 56 girls, together 100 children; seventeen other day-schools, with 380 boys and 311 girls, together 671 children; and 7 Sunday-schools, with 218 boys and 146 girls, together 322 children; and four Sunday schools in Stow-Upland, with 157 boys and 256 girls, together 413 children. There is a range of almshouses in the town, for the support of which, and for other charitable purposes, Thomas a Seckford, master of requests in the reign of Queen Elizabeth, left an estate in Clerkwell, one of the suburbs of London, the increased value of which estate has rendered the charity very wealthy. Only s Broadway had before the Reformation a small priory for canons of St. Augustin adjacent to the church. The yearly revenue of the priory was 40£. Beldon, or Bilton, is in Cosmetic hundred, on a small stream which flows into the Bredon, about 14 miles west-north-west from Ipswich. It had formerly a considerable manufactures about wool and sheep, but this branch of trade has long since given up. Some yards of calico are turned out, which was on Wednesday, is dispersed; but there are two yearly fairs. The area of the parish is 1420 acres: the population, in 1831, was 836, about one-third agricultural. The church is a good building, on a hill west of the village; and there is a Baptist meeting-house. Blythburgh is in Blything hundred, on the south bank of the Blyth, 30 miles north-east of Ipswich. The area of the parish is 3590 acres: the population in 1831 was 475, almost entirely agricultural. It is a place of great antiquity, and Anna, king of the East Angles, who fell in battle against Penda of Mercia, in the time of the Heptarchy, is said to have been buried here. It was in the middle ages an important fishing and trading town. Sessions for the district were once held here, and by which some portions remained to the middle of the last century. The church has been a very fine building, highly ornamented both within and without: the architecture is of perpendicular order, and though much defaced. The length of it is 127 feet, the width above 54 feet. There are some remains of painted glass in the windows, and there are some monuments, one of which is pointed out, but erroneously, as that of Anna, last king of the East Angles, who fell in battle against Penda in the same battle. There are some remains of a priory for the canons of St. Augustin; this priory was a dependency of the abbey of St. Oysth in Essex; its yearly revenues were £23; the dissolution was 46th. Ed. 104. There are some remains of another religious house. The suppression of the religious
houses, and a great fire in 1675, are supposed to have led to the decay of the town.

Botesdale is in the hundred of Hartsire, about 15 miles north-east from Bury, on the road to Norwich by Scole. With the village of Kickingall Inferior, which is in Blackbait Hundred, it forms a clean and pleasant village, enclosed with differently built houses. The area of the two parishes is 2050 acres; their joint population in 1831, 1120, nearly half agricultural. The market, formerly held at Botesdale on Tuesdays, has been discontinued, but there is a yearly fair. The church is a long building, but (which is only a parochial chapel) has some good portions of perpendicular architecture. It is dedicated to St. Botolph; and the name of the village is a corruption of St. Botolph's Dale. Near the church is a ginnel-school, which had, in 1833, above 30 scholars. Near Botesdale is Redgrave Hall, the handsome seat of Admiral Wilson; and in Redgrave church, which is about 2 miles from Botesdale, is a handsome monument to chief-justice Sir John Holt.

Brandon is in the hundred of Brandon, about 17 miles north-east of Bury, through Thetford. The area of the parish is 5570 acres; the population in 1831 was 2065, barely one-tenth agricultural. The village consists of three streets along the Mildenhall, Evedon, and Thetford roads, which cross each other at the site of a mill and a neat stone bridge over the Little Ouse into Norfolk. The houses are for the most part well built. The church is a little out of the village on the south-west, and is a good structure. The road to Bury has been discontinued for many years; but there are three yearly fairs. There are extensive rabbit-warrens in the neighbourhood, of which one alone is said to have furnished to the London market 40,000 rabbits yearly. Continuous strata of the finest flint occur in the fields. Brandon has been a market for several years, and Brandon and Botesdale give their names to the village. There is an endowed free school.

Haverhill is in Ribblestone hundred, about 16 miles south of Woodbridge; both town and parish extend for the present hundred of Hinxford, in the county of Essex. The area of the parish is 3320 acres; the population in 1831 was 2025, probably a fourth agricultural. The village consists of one principal street, wide, but lined with poor houses, running from south-east to north-west along the road from Colchester to Cambridge. The church is a large antiquated building, and there are two dissenting places of worship. There was another ancient church, and half a mile north-west of the town was a castle, of which there are no remains of buildings; it formed a street of houses for some years discontinued, but there are two yearly fairs. In the year 1831, 173 men were employed in the manufacture of drabbeets and Tuscan plait.

Bury Worth is in Blackbairn hundred, 7 miles north-east of Bury. The area of the parish is 2230 acres; the population in 1831 was 1061, more than half agricultural. There was antiently a priory for the regular canons of St. Augustin, founded about a.d. 1100; the yearly revenues of which at the dissolution were 290l. 9s. 5d. (or, according to some authorities, 294l. 9s. 5d.), gr. and 16£. 19s. 7d. clear. The village consists of one main street along the road from Bury to Norwich by Scole, and of one or two smaller streets. There are some remains of the priory, near which is the parish church. The very extensive remains of a Roman bridge have been discovered near the village. The market was given up some years since.

Mendlesham is in Hartsire hundred, about 15 miles north-west of Ipswich. The parish has an area of 2500 acres, and in 1831 was 1333, more than two-thirds agricultural. The village consists of mean houses, and the market has long been given up. The church is a handsome building, and there is a Methodist meeting-house. Mendlesham fought the battle of Marston Moor, and there were found here near the close of the seventeenth century: it was supposed to have belonged to one of the East Anglian kings.

Needham-Market is in Bosmere and Claydon hundred, 8 miles north-west of Ipswich, on the road to Bury. The area of the parish of Barking, in which the place stands, is 3010 acres; the population in 1831 was 1884, of which 1466 persons belonged to the hamlet or chapelry of Needham-Market. The village consists of one principal street and of some smaller ones: the houses are neat, and some of them even handsome. The chapel is a mean building, with a wooden belfry; and there are one or two dissenting places of worship. The woollen manufacture, formerly carried on here, has been long discontinued, but the market has been given up: a little paper and glue are made. The Gipping, which passes the town, is navigable. There is an endowed grammar-school.

The villages of Nayland consist of Bawcutt, 13 or 14 miles west-south-west of Ipswich. The area of the parish is 1470 acres: the population in 1831 was 1047, about one-third agricultural. The village is in a low situation, on the north bank of the river Stour, over which there is a bridge and a ferry. There are several good dwelling-houses in the place, and some large flour-mills: a considerable quantity of corn and flour is sent down the Stour to be conveyed to London. There is a yearly fair. The church is a handsome building, and there is a meeting-house for Independents. There is a national school. The market has been given up for some years, and the woollen manufacture, once flourishing, is quite extinct.

Wooldpit is in the hundred of Thevedewestry, 6 miles north of the route from Ipswich to Woodbridge and Ipswich. The area of the parish is 2010 acres; the population in 1831 was 880, less than half agricultural. The church is partly of flint and chalk; it is a handsome building, partly of decorated, partly of perpendicular character. There is a large market, and the church is approached by no less than 17 streets. Brandon has an old mansion-house and an almshouse or hospital. The population in 1831 was 2514, about one-third agricultural. Woodbridge, in Bury, on the Yarmouth road, about 4 miles beyond Saxmundham. It is pleasantly situated, and has a well-built street of modern houses. The population in 1831 was 1149. Hoxne (antiently Egleysone or Haigildun) has some historical interest as the place where St. Edmund was taken and killed by the Danes. It is in the hundred of Hoxne, on the bank of the Waveney, not far from Eye. The population in 1831 was 1243. Fressingfield, in the same hundred, was the birthplace of Robert Grosseste, bishop of Lincoln. East Bergbolk and Stratford St. Mary, which are both in Sawford hundred, near the bank of the Stour, belong to Colchester and Ipswich. East Bergbolk has, from the number of good houses in it, an appearance superior to that of most villages. The church is of perpendicular architecture, and has some curious portions. Stratford is pleasantly situated, and has a handsome church. At Preston, on the bank of the Orwell, in the same hundred, is a quadrangular stone tower, about ten feet by twelve in area, and six stories high, with a polygonal turret at each angle. Its date and history are uncertain. The population of East Benhol in 1831 was 1360, of Stratford 630, and of Preston 183. Wickham-Market (population in 1831, 1292), in Wilford hundred, between Woodbridge and Saxmundham, is on the hill commanding the view to Woodbridge and Gorleston. In Lordington hundred, are suburbs of Yarmouth, and are included in its parliamentary boundaries.

[pires MARYMOUTH.]

Decisions for Ecclesiastical and Legal Purposes.—Suffolk is partly the diocese of Norwich: it was formerly wholly included in it; but by the late alterations in the territorial arrangements of the church, the greater part of the archdeaconry of Sudbury, and part of the archdeaconry of Suffolk, have been transferred to the diocese of Ely. The western part is still included in the latter. The present ecclesiastical division of the county is as follows:—

2 29
1. Diocese of Norwich.

Archdeaconry of Suffolk.


Bremere | 19 | 4 | 4 | 3 | 20
Oxleford | 20 | 5 | 5 | 3 | 23
Crayanford | 11 | 2 | 2 | 1 | 15
Colneys | 9 | 3 | 3 | 2 | 14
Dunwich | 20 | 10 | 10 | 1 | 21
Hartismere (formerly belonging to the archdeaconry of Suffolk) | 27 | 4 | 2 | 2 | 33
Hartismere | 27 | 4 | 2 | 2 | 33
Ipswich | 10 | 2 | 2 | 1 | 15
Lose 
Loiithingham | 18 | 6 | 6 | 1 | 25
Oxford | 10 | 2 | 2 | 1 | 15
Samford | 19 | 6 | 6 | 1 | 26
South Elmham | 6 | 2 | 2 | 0 | 8
South Elmham (formerly belonging to the archdeaconry of Suffolk) | 6 | 2 | 2 | 0 | 8

Total of the county | 294 | 98 | 98 | 25 | 522

By the union of cures the number of benefices is considerably reduced. The rectories are not enumerated above. Chapels-of-ease are included in the fourth column. The above enumeration is from Cox's ' Clergy List' for 1842.

The peculiarities are, Hadleigh and Monk's-Bleigh rectories, and Moulton rectory and vicarage, belonging to Canterbury, and Frenzeekham rectory and vicarage, belonging to Rochester.

The county is included in the Norfolk circuit. The assizes are held in the spring at Bury St. Edmunds, and in the summer at Ipswich. The judges proceed to these places from Cambridge. Quarter-sessions for their respective divisions are held at Bury, Ipswich, Blecce, and Woodbridge. There are county gaols and houses of correction at Bury and Ipswich: county houses of correction at Woodbridge and Blecce; and borough prisons at Ipswich, Bury, Eye, Sudbury, Aldeburgh, Southwold, and Oxford. The county gaol and house of correction at Ipswich was built a.D. 1790, on what was then considered the best plan; but there are several defects in the arrangement, and some additions which are necessary are all noted in the original plan. The county gaol and house of correction at Bury are in an airy situation, just out of the town, well drained and well ventilated. The house of correction for females is a short distance from the gaol. The general management both of the gaol and house of correction for females is satisfactory. The houses of correction at Woodbridge and Blecce are ill arranged, and inadequate to that purpose. The borough prisons, some are inadequate and inconvenient; those at Oxford and Aldeburgh are seldom used; and for the borough of Brecon, prisoners are commonly sent to the county prison.

Suffolk is divided into the 'Geldable' portion, in which issues and forfeitures are paid to the king, and the 'Francises,' in which they go to the lords of the liberties. The Geldable part comprehends the hundreds of Blything, Blexhe, and Claydon, Hartismere, Hoxne, Loiithingham, and Mutford (two half-hundreds), South Elmham, Stow, and Wangford. The sessions held at Ipswich and Blecce are for this portion. The franchises of liberties are those of—1. St. Ethuler, including the hundreds of Carline, Colney, Lois, Pomegaste, Threling, and Wilford; 2. St. Edmund, including the hundreds of Babergh, Blackbourn, Cosford, Lackford (including the half-hundred of Evening or Evening, which is in the part of the county nearly surrounded by Cambridgeshire), Risbridge, Thedwesry, and Teyings; and 3. the Duke of Norfolk, including certain of his manors, for which he returns all writs, and receives all fines and amercements, as well as the right of appointing a coroner. The assizes for the two liberties of St. Ethuler and St. Ed- hean are held at Woodbridge and Bury respectively. The liberty of St. Edmund returns a grand jury at the assizes distinct from that returned by the rest of the county.

The counties of Norfolk and Suffolk were under one sheriff until the year 1576.

Before the Reform Act Suffolk returned sixteen members to Parliament: two for the county; and two each for the boroughs of Ipswich, Bury, Sudbury, Eye, Oxford, Aldeburgh, and Dunwich. Ipswich and Sudbury were open boroughs, but had corrupted; Eye had corruption reduced to two members; none of the others had more than 40 voters. By the Reform Act, the county was formed into two divisions, the Eastern and Western, each returning two members; Dunwich, Oxford, and Aldeburgh were entirely disfranchised, and Eye was reduced to one member. Eleven members were for the first time returned from Suffolk, being five less than before the Reform Act.

The Eastern division of the county comprehends the hundreds of Blything, Blecce, and Claydon, Carford, Colney, Hoxne, Loiithingham, Mutford, Pomegaste, Samford, Threling, Wangford, and Wilford. The county of election is held at Ipswich; and the polling-places are Ipswich, Woodbridge, Needham-market, Framlingham, Saxmundham, Blecce, and Halsum. The Western division comprehends the hundreds of Babergh, Blackbourn, Cosford, Hartismere, Lackford, Risbridge, Stow, Thedwesry, and Teyings. The court of election is held at Bury; and the polling-places are Bury, Wickham, Blything, Lavenham, Stow-market, Blytham, Mildenhall, and Hadleigh. A slight addition was made to Sudbury, and a considerable one to Eye.

The constituency is as follows:

<table>
<thead>
<tr>
<th>Voters on the Register</th>
<th>1858</th>
<th>1832–49</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Suffolk</td>
<td>6147</td>
<td>6404</td>
</tr>
<tr>
<td>West Suffolk</td>
<td>4799</td>
<td>5061</td>
</tr>
<tr>
<td>Ipswich</td>
<td>1418</td>
<td>1729</td>
</tr>
<tr>
<td>Bury</td>
<td>654</td>
<td>704</td>
</tr>
<tr>
<td>Sudbury</td>
<td>578</td>
<td>594</td>
</tr>
<tr>
<td>Eye</td>
<td>278</td>
<td>332</td>
</tr>
</tbody>
</table>

History and Antiquities. —Suffolk appears to have been comprehended with Norfolk in the territories of the S merits of Thebaid of Ptolemy, called by others the Ioni; or, if we follow Prior of Canterbury, or the name of the town of the same writer, and the Gennanion of the Notitia Imperii. The river Waveney and its valley appear, in the British and Roman periods, to have been one of the branches of that river, which is navigable for the passage of large vessels. The island, as described elsewhere. [Suffolk, vol. xvi., p. 259.]

It is there noticed that the peninsula penetrated at least as far as Bungay: it probably extended higher up, for we have seen that traces of ancient navigation have been noticed at Ipswich, or the Eye, which must have been established upon a branch of this peninsula, or on some navigable river running into it.

The exact locality of the above-mentioned towns has been the subject of much difference of opinion. It will be well first to notice the direction in which Roman or other ancient roads have been traced. A road from Loundinum (London) and Camalodunum (Colchester) entered the county at Stratford, between Colchester and Ipswich, and running in a northward direction to the Ipswich and Norwich road, at Saxmundham and Lowestoft, and then coincided with the present line of that road till it quits the county to enter Norfolk at Scole inn.

Another line, the 'Fedwar-way,' or 'Feddar-way,' entering the country at the point of Lowestoft, across the Little Ouse at Clacton, runs southward to the neighbourhood of Ixworth, where Roman remains have been discovered. We believe this road has not been traced beyond Ixworth, or indeed scarcely so far; but the direction of existing lanes and roads, and the names of places, lead us to conjecture that it ran in a direction from Dunwich Street, Woolpit, Fen-Street, and Low-Street to the neighbour- hood of Bideford, and possibly joined the road already described at the passage of the Stour at Stratford. 'The Ickfeld-way,' or 'Ickfield-Street,' crossed the county in a south-west direction from the river-bou- head of Newmarket. Another line, nearly parallel to this, appears to have run from the source of the Waveney and
Little Ouse (perhaps then the narrowest part of the estuary, which, according to some traditions, insolated Norfolk) by Ixworth to the neighbourhood of Bury. Both these roads must have crossed the line of the Peddar-way, the latter near Ixworth, the former a few miles north of it. Besides these, there was in the eastern part of the county a road which entered the county across the estuary of the Waveney at Bungay, and ran by Halesworth to Dunwich: it is known as Stone-Street; and a road crossed the south-western corner of the county by Haverhill, part of a line from Cambridgeshire to Essex. These roads are, we believe, all the known roads; but the remarkable peculiarities in the direction of existing roads and lanes convince us that a Roman road entered the county across the most direct line of road; and the stations Cambronetum and Sitomagus, which occur in the interval, must be considered as doubtful. The proposal to fix them respectively at Grundisburgh, or rather Bury, near Ipswich, where there is an antient road, is not sustained by evidence. The Roman site of Salisbury is not exactly Bury, or Ipswich, but it renders it difficult to fix the position of Sitomagus. As for Iceni and Villa Faustini, we can only conjecture that the first was at Ixworth, where are some Roman remains, and the second on the Roman road at Yaxley, near Eye. Bury castle, one of the most remarkable Roman remains in England, is described elsewhere. [BURGH CASTLE, vol. vi., p. 26.] It is generally supposed to have been the Garianunon of the Notitia, but this may be doubted. [NORFOLK, vol. xvi., p. 265.]

Roman antiquities have been found at Blythburgh, on Bungay common, at Bury, at Dunwich, at Eye, at Haughley, near Stonewart, where a Norman castle was erected on the site of a Roman camp, at Icklingham, Ipswich, Yoxford, and at Eye, near Newmarket, at Ixworth, at Pakenham near Ixworth, where a tessellated pavement was dug up, at Stow Langtoft in the same neighbourhood, where are the remains of a camp, at Felixton near the mouth of the Deben, and at Wenham near Stratford.

In the Anglo-Saxon period Suffolk passed through similar changes to Norfolk. [NORFOLK.] It was probably settled by a body of Angles independent of those who occupied Mercia and Essex. They describe the relative position of these two bodies. Suffolk was probably, from its proximity to the other Anglo-Saxon states, the more important division of the two, and the scene of several events. The battle in which Anna or Anna the Elder (Anglia, and his son Firminius, fell fighting against Penda, king of Mercia (A.D. 634), is supposed to have occurred at Bull camp or Bulchamp, near Blythburgh. Anna's house is said to have been burned at Blythburgh, and the remains of St. Anna near there, of which St. Ethelred I, brother and predecessor of Alfred the Great, was taken by the Danes (A.D. 870), and cruelly murdered at Higaldon, now Hoxne (on the bank of the Waveney, near Scole), and was first buried there; but his body was afterwards removed to Bury. One of the most remarkable remains of Sutton, or Sunday Hill, near Yoxford, on the road from Ipswich to Yarmouth, there are extensive remains. The monastic ruins of Eye, Dunwich, and Clare have been noticed in the former part of this article. There are some remains of Herringfleet Priory for the monastic clergy of the Premonstratensian abbey, near the coast, between Dunwich and Aldeburgh; and of Mendham Cunica priory, on the Waveney, the latter partly converted into a farm-house. Of ecclesiastical remains the most remarkable are Framlingham Priory, in the county of Suffolk, not far from Bury St. Edmunds; and Langley Priory, near Ipswich, which are respectively [BURY] and [METTINGHAM].

In the civil war of Stephen and Henry of Anjou, afterwards Henry II., the county was held by Hugh Bigod for Henry, was taken by Stephen (A.D. 1153). In the war of Henry the younger and his brothers against his father, Henry II., a body of Flemings under the Earl of Leicester, on the side of the latter, was defeated by a partisan of the former, landed in Suffolk, at Walton, south-east of Ipswich, and were joined by Hugh Bigod, one of the most powerful noblemen of these parts. After vainly besieging Walton Castle, they advanced inland, and, at Fornham St. Genevieve, on the bank of the Lark, between Bury and Mildenhall, were met and routed, with the loss of above ten thousand Flemings, by the king's army under Richard de Lacy and Humphrey de Bohun, constable of England. The Earl of Leicester and his wife were taken prisoners (A.D. 1175). Bigod, who had been absent with his army, now joined his predecessor in arms. In the civil war of John, the county was reduced to submission (A.D. 1216) by William Fitzpiers, Robert Fitzwalter, and William de Huntingfield, dispatched for the purpose by Prince Louis of France, and the archbishop of Canterbury, invited over to oppose John. In the insurrection of the populace in the time of Richard II. (A.D. 1382), those of Suffolk took arms, and murdered, at Bury, Sir John Cavenish, chief justice of England, and some of the monks of the abbey on the sea-coast.

The county includes a part of the ancient Roman camp of Gariannonum near Southwell, which is possible that some Roman camp once existed near Mildenhall, which is a strange distillation of the name Mildenhall, but this is not proved. On a hill near Fornham St. Genevieve, on the river Lark, is the site of Butley Abbey (for canons of St. Augustin) which was 318 ft. 23d., and of Sitomagus; and that of Butley Abbey (Cistercian) was 230 ft. 13d. The remaining remains of Butley Abbey are noticed in the former part of this article. It is the most ancient part of the former abbey, being the earliest part of the abbey, and it is situated on a site of the abbey, but of less magnitude. In the close period of the abbey near Yoxford, on the road from Ipswich to Yarmouth, there are extensive remains. The monastic ruins of Eye, Dunwich, and Clare have been noticed in the former part of this article. There are some remains of Herringfleet Priory for the monastic clergy of the Premonstratensian abbey, near the coast, between Dunwich and Aldeburgh; and of Mendham Cunica priory, on the Waveney, the latter partly converted into a farm-house. Of ecclesiastical remains the most remarkable are Framlingham Priory, in the county of Suffolk, not far from Bury St. Edmunds; and Langley Priory, near Ipswich, which are respectively [BURY] and [METTINGHAM].

Framlingham Castle is near Bungay; a considerable portion of the town, extended their ravages inland, and gained a victory over the East Anglians, who, under their general Ulfyteif or Ulfytyle, made head against them. The scene of this battle is at Bury St. Edmunds. In the closing period of the Anglo-Saxon dynasty, Suffolk was a separate earldom, under Gurth, the brother of Harold II. * Gurth, as well as Harold, fell at Hastings.

In the civil war of Stephen and Henry of Anjou, afterwards Henry II., the county was held by Hugh Bigod for Henry, was taken by Stephen (A.D. 1153). In the war of Henry the younger and his brothers against his father, Henry II., a body of Flemings under the Earl of Leicester, on the side of the latter, was defeated by a partisan of the former, landed in Suffolk, at Walton, south-east of Ipswich, and were joined by Hugh Bigod, one of the most powerful noblemen of these parts. After vainly besieging Walton Castle, they advanced inland, and, at Fornham St. Genevieve, on the bank of the Lark, between Bury and Mildenhall, were met and routed, with the loss of above ten thousand Flemings, by the king's army under Richard de Lacy and Humphrey de Bohun, constable of England. The Earl of Leicester and his wife were taken prisoners (A.D. 1175). Bigod, who had been absent with his army, now joined his predecessor in arms. In the civil war of John, the county was reduced to submission (A.D. 1216) by William Fitzpiers, Robert Fitzwalter, and William de Huntingfield, dispatched for the purpose by Prince Louis of France, and the archbishop of Canterbury, invited over to oppose John. In the insurrection of the populace in the time of Richard II. (A.D. 1382), those of Suffolk took arms, and murdered, at Bury, Sir John Cavenish, chief justice of England, and some of the monks of the abbey on the sea-coast.
The following is a table from the document:

<table>
<thead>
<tr>
<th>HOUSES.</th>
<th>OCCUPATIONS.</th>
<th>PERSONS.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Families</td>
<td>Uninhab.-</td>
</tr>
<tr>
<td>Borough</td>
<td>Inhabited.</td>
<td>families</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babergh</td>
<td>4,489</td>
<td>5,179</td>
</tr>
<tr>
<td>Blackbourn</td>
<td>1,929</td>
<td>2,655</td>
</tr>
<tr>
<td>Blithorne</td>
<td>3,917</td>
<td>4,998</td>
</tr>
<tr>
<td>Bournemouth &amp; Clinton</td>
<td>2,361</td>
<td>2,911</td>
</tr>
<tr>
<td>Chard</td>
<td>1,014</td>
<td>1,325</td>
</tr>
<tr>
<td>Colne</td>
<td>647</td>
<td>882</td>
</tr>
<tr>
<td>Cosford</td>
<td>1,917</td>
<td>2,157</td>
</tr>
<tr>
<td>Harriet</td>
<td>3,412</td>
<td>3,559</td>
</tr>
<tr>
<td>Halmore</td>
<td>2,162</td>
<td>2,592</td>
</tr>
<tr>
<td>Lackford</td>
<td>2,401</td>
<td>2,713</td>
</tr>
<tr>
<td>Loe</td>
<td>2,502</td>
<td>2,768</td>
</tr>
<tr>
<td>Milford &amp; Lothing</td>
<td>3,956</td>
<td>3,302</td>
</tr>
<tr>
<td>Plumes</td>
<td>1,730</td>
<td>2,383</td>
</tr>
<tr>
<td>Ribe</td>
<td>2,850</td>
<td>3,349</td>
</tr>
<tr>
<td>Sanfor</td>
<td>1,532</td>
<td>2,187</td>
</tr>
<tr>
<td>Stowe</td>
<td>1,390</td>
<td>1,716</td>
</tr>
<tr>
<td>The city</td>
<td>1,383</td>
<td>2,139</td>
</tr>
<tr>
<td>Thrigby</td>
<td>963</td>
<td>1,294</td>
</tr>
<tr>
<td>Threding</td>
<td>435</td>
<td>668</td>
</tr>
<tr>
<td>Wangford</td>
<td>2,454</td>
<td>2,810</td>
</tr>
<tr>
<td>Wilford</td>
<td>1,108</td>
<td>1,490</td>
</tr>
<tr>
<td>Bury St. Edmunds</td>
<td>2,231</td>
<td>2,429</td>
</tr>
<tr>
<td>Ipswich</td>
<td>4,116</td>
<td>4,450</td>
</tr>
<tr>
<td>Sudbury</td>
<td>971</td>
<td>1,076</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>50,139</td>
<td>64,533</td>
</tr>
</tbody>
</table>
The number of turnpike trusts in 1839 was 14; income from tolls, 9,940£; from parish compositions, in lieu of statute duty, 51£; and the total income was 10,337£, the total expenditure for the same year being 10,583£. The assets, including arrears of income, amounted to 2,117£, the debts to 34,288£. In 1836 the debt was equal to 2⅝ years of the annual income;—the proportion for England being 4 years; the proportion of unpaid interest to the total debt was 16 per cent., the average for England being 12 per cent.

In 1839 the church-rates amounted to 11,986£; and 3,194£ applicable to the same objects was derived from other sources. In 1832 the sum derived from 'other sources' included 3,979£, and in 1839 it was 3,979£. The amount expended for the purposes of the Establishment amounted to 14,443£ in 1839, out of which 7,164£ were expended on repairs of churches.

Criminal.—Number of persons charged with criminal offences in the septennial periods ending 1819, 1826, 1833, and 1840:—

<table>
<thead>
<tr>
<th>Year</th>
<th>1819-20</th>
<th>1826-27</th>
<th>1833-34</th>
<th>1840-41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,130,485</td>
<td>1,292,596</td>
<td>1,243,316</td>
<td>1,024,277</td>
</tr>
<tr>
<td>Annual average</td>
<td>185</td>
<td>277</td>
<td>375</td>
<td>495</td>
</tr>
</tbody>
</table>

The numbers committed, convicted, and acquitted in each year from 1834 to 1839 were as under:—

<table>
<thead>
<tr>
<th>Year</th>
<th>1834</th>
<th>1835</th>
<th>1836</th>
<th>1837</th>
<th>1838</th>
<th>1839</th>
<th>1840</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committed</td>
<td>484</td>
<td>450</td>
<td>493</td>
<td>505</td>
<td>527</td>
<td>484</td>
<td>490</td>
</tr>
<tr>
<td>Acquitted</td>
<td>138</td>
<td>134</td>
<td>127</td>
<td>129</td>
<td>153</td>
<td>135</td>
<td>136</td>
</tr>
<tr>
<td>Convicted</td>
<td>346</td>
<td>316</td>
<td>371</td>
<td>334</td>
<td>342</td>
<td>375</td>
<td>349</td>
</tr>
</tbody>
</table>

In 1834 the number of persons committed to the total population of the county, was 1 in 612; and in 1840, allowing for the increase of population, 1 in about 619. Of 484 criminal offenders tried during the assizes in 1840, there were 24 charged with offences against the person; 40 with offences against property committed with violence; 401 (including 327 cases of simple larceny) with offences against property committed without violence; 3 with malicious injury; and 6 with vagrancy and vagabondage. Forty-three were transported for uttering base coin; and 13 for various misdemeanors. About eighty-two per cent. of the offences were those against property committed without violence; and about sixty-seven per cent. were cases of petty larceny. Sentence of death was recorded in 1 case, which was committed into transportation for life. Of 349 offenders convicted, including the one above-mentioned, 5 were transported for life; 1 for periods varying from 10 to 15 years; 21 from 7 to 10 years; 36 for lesser periods; and all 83 offenders transported; 1 was imprisoned for above 2 years; 18 for a term exceeding 12 months; 51 for above 6 months; and 193 for 6 months and under; and 3 were whipped, fined, or discharged on sureties. The acquittals were 135 in number; in 15 cases there was no prosecution; 38 no bill was found; and 82 persons were found not guilty on trial. Of the total number committed, 400 were males and 84 females; 177 males and 24 females could neither read nor write; 173 males and 48 females could read, or read and write imperfectly; 37 males and 4 females could read and write well; and the state of instruction of 13 males and 3 females was not ascertained. On an average of several years the proportion of uninstructed criminals in the county was 37%; —the instruction of 37% per cent. —the average of the former for England and Wales being 89% per cent.

Banks.—There are 13 of these institutions; and the number of depositors and amount of deposits on the
20th of November in each of the following years was as under:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Depositors</th>
<th>Deposits in £</th>
<th>Depositors in</th>
<th>Deposits (in £)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1832</td>
<td>1,524</td>
<td>6,675</td>
<td>248</td>
<td>1,328</td>
</tr>
<tr>
<td>1833</td>
<td>1,537</td>
<td>6,890</td>
<td>252</td>
<td>1,366</td>
</tr>
<tr>
<td>1834</td>
<td>1,549</td>
<td>7,113</td>
<td>254</td>
<td>1,408</td>
</tr>
<tr>
<td>1835</td>
<td>1,561</td>
<td>7,182</td>
<td>254</td>
<td>1,421</td>
</tr>
</tbody>
</table>

The distribution of the sums invested in 1830, 1834, and 1839, on the 20th of November in each year, was as under:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Depositors</th>
<th>Deposits in £</th>
<th>Depositors in</th>
<th>Deposits (in £)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1830</td>
<td>1,524</td>
<td>6,675</td>
<td>248</td>
<td>1,328</td>
</tr>
<tr>
<td>1834</td>
<td>1,537</td>
<td>6,890</td>
<td>252</td>
<td>1,366</td>
</tr>
<tr>
<td>1839</td>
<td>1,561</td>
<td>7,182</td>
<td>254</td>
<td>1,421</td>
</tr>
</tbody>
</table>

The deposits of 200 friendly societies, not reckoned above, amounted, in 1840, to 22,158£; and 8,670£ were invested by 200 charitable institutions.

The state of the elective franchise in 1839-40 is shown in the following table:

<table>
<thead>
<tr>
<th>Classes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeholders of every class</td>
<td>3,708</td>
</tr>
<tr>
<td>Copyholders and customary tenants</td>
<td>742</td>
</tr>
<tr>
<td>Leasholders for life or for a term</td>
<td>40</td>
</tr>
<tr>
<td>50. tenants at will</td>
<td>1,633</td>
</tr>
<tr>
<td>Trustees and magistrate</td>
<td>14</td>
</tr>
<tr>
<td>Qualified by offices</td>
<td>134</td>
</tr>
<tr>
<td>Joint and duplicate qualifications</td>
<td>83</td>
</tr>
</tbody>
</table>

Total: 6,404

Education.—Summary of the Returns made to Parliament in 1833:

<table>
<thead>
<tr>
<th>Schools</th>
<th>Scholars</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant schools</td>
<td>117</td>
<td></td>
</tr>
<tr>
<td>Number of children at such schools; ages from 2 to 7 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>595</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>639</td>
<td></td>
</tr>
<tr>
<td>Sex not specified</td>
<td>879</td>
<td></td>
</tr>
<tr>
<td>Total: 2,113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily schools</td>
<td>961</td>
<td></td>
</tr>
<tr>
<td>Number of children at such schools; ages from 4 to 14 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>11,733</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>10,317</td>
<td></td>
</tr>
<tr>
<td>Sex not specified</td>
<td>4,479</td>
<td></td>
</tr>
<tr>
<td>Total: 26,592</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total of children under daily instruction</td>
<td>28,642</td>
<td></td>
</tr>
<tr>
<td>Sunday schools</td>
<td>488</td>
<td></td>
</tr>
<tr>
<td>Number of children at such schools; ages from 4 to 15 years:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>12,477</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>13,015</td>
<td></td>
</tr>
<tr>
<td>Sex not specified</td>
<td>4,738</td>
<td></td>
</tr>
<tr>
<td>Total: 33,234</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number of children in Suffolk, in 1833, between the ages of 2 and 15, may be computed at about 77,000, and between 4 and 14, at about 66,000. Eighty Sunday schools, attended by 3130 children, were returned from places where no other schools existed; but in all other places in the county the children had also the opportunity, and many of them were in the habit of attending daily schools as well; but to what extent duplicate returns were caused by this circumstance cannot be ascertained. Fifty-seven schools, attended by 3910 children, were both Sunday and daily schools, and thus far only can duplicate returns be discovered. Taking the numbers returned under daily instruction (28,642), and those attending Sunday-schools (30,230), the total number of children is 58,872, which falls short by some thousands of the total number of children between the ages of 2 and 15. The number of boarding-schools was 58.

Maintenance of Schools.

<table>
<thead>
<tr>
<th>Description of Schools</th>
<th>By subscription</th>
<th>By payment of school fees</th>
<th>By contributions of the inhabitants</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Schools</td>
<td>2,026</td>
<td>3,569</td>
<td>4,137</td>
<td>9,722</td>
</tr>
<tr>
<td>Daily Schools</td>
<td>2,026</td>
<td>3,569</td>
<td>4,137</td>
<td>9,722</td>
</tr>
<tr>
<td>Total</td>
<td>4,052</td>
<td>7,138</td>
<td>8,274</td>
<td>19,464</td>
</tr>
</tbody>
</table>

According to the Reports of the Charity Commissioners, there are annual funds amounting to 3911L applicable to the purposes of education; the income of endowed schools is 2972L, and a sum of 1016L is for educational purposes in schools not endowed. The Schools established by Dissenters, included in the above table, are—

<table>
<thead>
<tr>
<th>Schools</th>
<th>Scholars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily schools</td>
<td>15, containing 390W</td>
</tr>
<tr>
<td>Sunday schools</td>
<td>105, 9,419</td>
</tr>
<tr>
<td>The schools established since 1818 are— Infant and other daily schools</td>
<td>506, containing 13,753</td>
</tr>
<tr>
<td>Sunday schools</td>
<td>231, 16,251</td>
</tr>
<tr>
<td>Lending libraries were attached to 41 schools in 1833.</td>
<td></td>
</tr>
</tbody>
</table>

SUFFRAGAN. [Bishop.]

SUGAR (French, Sucre; German, Zucker; Italian, Zucchero; Russian, Sachar; Spanish, Azucar; Arabic, Sukhar; Malay, Sool; Sanscrit, Sarhara). The sugar of commerce is a sweet crystalized substance most commonly prepared from the expressed juice of the sugar-cane, of which there are several species [Saccarum, vol. xi., p. 299]; but sometimes from beet-root [Best, vol. iv., p. 160], from the sap of one or more species of maple (maple, vol. ii., p. 72), and from other substances. The chief constituents of the principal saccharine substances known to chemists, chiefly condensed from these materials, may asser the reader in taking a connected view of the subject.

Mr. Aikin commences his account of the substances which contribute to the sensation of sweetness to the organs of taste, by alluding to the singular fact that the sensation may, under particular circumstances, be produced not merely by the contact of a sweet substance with the nervous p Lum of the tongue and palate, but also by the contact of a dry substance, and insipid substance, the glands and tongue being themselves not sweet but bitter; or, more properly speaking, acid. This circumstance, which is analogous to what is known optical phenomena (alluded to in the account of the artificial spectra, in the article Light, vol. x., p. 506), is supposed to account for the reported sweetness of the waters of the Nile and some other rivers in the East; since natural pure water, which we should merely designate fresh, is, 'not merely liquid, but actually, literally, sweet and delicious as milk,' to the palates of travellers who have been compelled to drink of the bitter springs found in the sandy deserts of Syria and Arabia, and in those which insulate the valley of the Nile. The sensation of sweetness is produced not only by many vegetable and animal substances, but also by some of purely chemical character. Of the latter Aikin mentions the soluble salts of lead (one of which, the acetate, was formerly called sugar of lead); the hydro- sulphates of silver and copper; and an earth which exists in the sandy deserts of Syrma, and which has been extracted with a property of forming sweet salts with acids. [Glucinium, vol. xi., p. 277.]

Of animal substances, Aikin observes that the muscular sacs of animals are filled with a liquid substance, of which the sweetness is due to the presence of the saccharine substances, which are in a portion of it, and which is often vomited by animals, and is found in the stomach of animals in a crystallized state. It may be extracted from flesh by boiling water, in which...
muscular fibre is insoluble; but as Aikin was not aware of any attempts to obtain the sweet matter in a separate state, he could not tell whether it agrees in essential character with any of the other sweets obtainable from the products of animal and vegetable organization; and whether it is a substance obtainable from most of the fats or expressed oils, whether animal or vegetable, by the process of saponification. [SOAP, vol. xxxi., p. 169.] In its purest state, glycerin is in the form of a sweet syrup, which is not capable of crystallization, but which is obtainable by evaporating the clear liquid substance, which is occasioned by a saccharine substance called sugar of milk, the proportion of which, in the milk of various animals, is shown in vol. xv., p. 218 [MILK], while its crystalline state is facilitated in p. 234 of that volume. This substance has been, and we presume still is, made in considerable quantities in some parts of Switzerland, for medicinal purposes. It is, according to Aikin, made from the whey left after making cheese. The whey is first heated to separate the butter from it, and is then boiled down to the consistence of syrup, which is poured into earthen pots, and exposed to the sun until it is nearly solid. The mass is then put into water, and heated till the sugar is dissolved, and the insoluble impurities are separated by pouring the hot liquor through a linen filter. It is then clarified with white of egg, and again evaporated. It deposits, on cooling, a whitish crystalline mass, which differs little from vegetable sugar, but is less soluble in water, and will not undergo crystallization by subjecting it to the ordinary process of crystallization.

Beckmann, who notices the history of the invention of this substance in his 'History of Inventions' (vol. iv., p. 599, English edit. of 1814), describes the mode of preparing it from new milk; but he observes that the sugar so made is not the true sugar, but a maltose, that is, a sugar of milk from which the butyric and caseous parts have been carefully separated. The only other sugar of animal origin, mentioned by Mr. Aikin, is that found in the urine of the horse; it is the disease called diabetes melittus. [DIABETES, vol. viii., p. 470.]

Honey-dew, or aphis-sugar, and the honey of the bee, are intermediate between animal and vegetable sugars; because, though derived from vegetable juices, they are modified by digestive powers. The same is the case with the sugar described in p. 235 of this volume; and in the article on the properties of sugar, in the same page, is a notice of the formation of sugar from the starch contained in it, many vegetable productions. Among vegetables which contain sugar readily formed (though not in a crystallized or separate state), there are several trees from the sap of which it may be obtained in sufficient quantity for human use. Two of these—the sycamore and the birch—are natives of Britain, and are sufficient to repay the expense of manufacture. The sugar-maple, which abounds in some parts of North America, yields sugar in such abundance as to be of considerable importance. Many trees of the palm family afford a sweet sap, which, though not commonly applied to domestic purposes, might be made into sugar. [BORASSUS, vol., v., p. 173.] Palm-sugar is called diab; and Mr. Aikin thinks that perhaps it is alluded to by Pliny under the name duban [xxii. 7.]. For notices of manna-sugar, see MANNA, vol. xiv., p. 386, and pp. 255 and 296 of this volume.

Saccharine matter exists in many ripe fruits in great abundance, as is evident not only from their sweet taste, but also from the circumstance that it exudes from some, as the fig and the grape, in the process of drying. From the foregoing remarks it appears that sugar has never been made, perhaps owing to the difficulty of extracting granulated sugar from a fruit containing so much mucilage. Attempts have been made to extract solid sugar from grapes, but without much success. M. Proust, a chemist in the service of the king of Spain, tried to accomplish this object, with the hope of preventing the annual waste of many thousand tons of grapes; but while he obtained a solid sugar of coarse quality, it was at too great an expense. The sugar-cane, or Mosquito cane, appears to have been the first object of sugar. Political troubles put an end to this experiment; but the manufacture of sugar from grapes was again tried in consequence of the loss of the French sugar colonies, under the encouragement of the French government. Great difficulties were met with in the attempt. The juice, when expressed from the grapes, to ferment; from its liability to contract an unpleasant flavour while boiling down; and from the difficulty of separating the tartrar which all grape-juice contains. The two former difficulties were much lessened by the judicious application of sulphuric acid, but the last was not overcome; and at length the attempt to separate the sugar in a crystallized form was abandoned; and the juice, reduced to a thick syrup, was brought into extensive use as a substitute for sugar, until the return of peace rendered its use no longer necessary.

Aikin states that white grapes were preferred for the purpose. The first process in the manufacture was the addition of sulphuric acid to the juice, either by stirring into the cold liquid sugar solution, or by blowing through the latter a stream of 500 of the liquor; or by filling a tub with sulphuric acid gas, and then pouring the juice into it through a colander, so that it might be divided into a great number of streams, which would cool the liquid sugar. The liquor thus remained quiet for a day or two, in which time the sweet matter was deposited. The clear liquor, being drawn off, was then boiled alone, if it had been mixed with sulphite of lime; or with the addition of some chalk, if sulphuric acid gas had been employed. After a partial evaporation of the syrup was clarified, either with blood, with white of egg, or with animal charcoal and white of egg, the latter being considered the best. The liquor, while boiling hot, was run through a filter, and subsequently boiled down to a thick syrup. When the sugar was required in a solid state, the syrup was boiled rather more than in the former case, and was kept in a cool place for a fortnight after boiling. At the end of this time it had the consistency of candied honey; and was known as grape-sugar, or grape sugar. At the time of grapes, that is, the juice boiled down to the consistence of honey, has been long known in Syria and Egypt; and that Dr. Shaw, who, when in those countries, ascertained that two thousand quintals of it were annually exported to Egypt from the neighbourhood of Achab, attributed a very high antiquity to this preparation. He says further that Dr. Russell, in his 'History of Aleppo,' mentions it under the name of dibes (being the same that is answered to datesugar), and represents it as a common article of food at that place.

Several roots, particularly of the tuberous or fleshy kind, contain sufficient saccharine matter to be important, either for separating it in a pure state, or in the form of an extract of all the soluble ingredients of the root. Of all the latter, the best class licorice is one of the most important. See GLYCERIN: GLABRA (vol. xi., p. 278), and LICORICE, Sugar, in p. 235 of this volume. For the former purpose, attempts have been made to separate several fleshy roots employed as food. Marggraf, a Prussian chemist, paid particular attention to the subject by a memoir printed in the 'Transactions' of the Academy of Berlin, for 1747. The roots he tried were the skirted (a variety of parsnip), the white beet, and theBerlin white. His experiment was continued for some years afterwards by M. Achard, at the desire of the Prussian government. Probably these and some other early experiments led, in some degree, to the subsequent introduction of the manufacture of beet-root sugar in France under M. Chapital. [BET, vol. i., p. 169.]

The above details show how many sources there are from which sugar might be obtained. None of them however, as far as experiment has shown hitherto, will bear comparison with the sugar-cane and the sugar-fruit. Any doubt as to whether even beet-root sugar could enter into competition with that from the cane, unless aided by fiscal regulations.

**Notices of Sugar—And the Sugar-cane by ancient writers.**

—It has been conjectured, although the opinion is not generally adopted, that the Hebrew word used in several places in the Old Testament, and rendered by our translators calamus, was in some places, and in others sweet cane, refers to the sugar-cane, and the sugar-fruit which has been termed sugar. Political troubles put an end to this experiment; but the manufacture of sugar from grapes was again tried in consequence of the loss of the French sugar colonies, under the encouragement of the French government. Great difficulties were met with in the attempt. The juice, when expressed from the grapes, to ferment; from its liability to contract an unpleasant flavour while boiling down; and from the difficulty of separating the tartrar which all grape-juice contains. The two former difficulties were
English version 'strong drink,' and the produce of the sugar-cane. This proposition is noticed elsewhere [Saccharum, vol. xx., p. 239]; and the allusion of Herodotus (De Gente Plant., lib. vi. c. 16, ed. Hain), quoted by Dr. Moseley, he describes a reed or cane that grew in moist places in Egypt, which was sweet even to the roots. Moseley quotes this passage, although it appears doubtful whether such a reed really existed, because, he observes, other writers have mentioned this reed with sweet roots, probably from him; and many have supposed the sugar-cane was the reed alluded to, though erroneously described. Thus Bassarobuces (about n. 223) as quoted by Strabo (693, Casaburg, vol. xx., p. 239), relates that 'the reed (in India) yields honey without bees;' but his statement, while it carries back the account of the sugar-cane to more than three centuries before the Christian era, is no more probable. Nearchus (ibid. viii. c. 19) alludes to it, or at least to have it, hazlenut. There are called honey-nut. There is no indication for this, nor any other means of determining the origin of the Christian era, and to prove that its origin was imperfectly understood by ancient Greek and Roman writers. Dr. W. Falconer, in a Sketch of the History of Sugar, vol. i. p. 49, says, 'from the early date of the Periplus of Timotheus, published in the fourth volume of the Memoirs of the Library and Philosophical Society of Manchester,' in 1796, has given quotations from several early authors not mentioned above; and Dr. Moseley's Treatise on Sugar also goes very minutely into its early history, and gives the opinions of early medical writers respecting its use, which, in the period above alluded to, appears to have been chiefly medicinal. Although more than one writer speaks of sugar as coming from Arabia as well as India, he conceives that, at any rate when in the form of candy, it could not have been made in the former country. Indeed the early Arabian writers themselves speak of sugar as coming from India. It appears probable that the white sugar-candy of China, which has been introduced into Europe for its excellence, was the Indian salt of the Roman authors.

Introduction of Sugar into Europe, America, and the West Indies.—Dr. Falconer, after giving passages from Greek, Roman, and Arab writers down to the end of the Middle Ages, speaks of the crusaders, who describe the sugar-cane as met with by the crusaders in Syria. One of these, Albertus Agnesius, about the year 1108, says that 'sweet honied reeds,' which were called Zactra, were found in great quantity in the meadows about Tripoli. These sugar-canes were cultivated by the crusaders, who, under the name of sugar-cane, called them sugar. In the time of harvest they bruise it, when ripe, in a mortar, and set by the strained juice in vessels till it is concreted in the form of snow or of white salt. This, when scraped, they mix with bread, or rub it with water and take it as potage; and it is to them more wholesome and pleasing than the honey of bees. This is, as far as we are aware, the oldest description extant of the process of extracting sugar from the cane. It appears to have been practised at that time to a considerable extent; for the same author, in his account of the reign of Haidar Pasha, who died in the year 1727, says the following of the sugar from the cane:—'In the month of March, the army, which contained eleven camels laden with sugar. Another of these historians, Jacobus de Vitiaco, in 1124, says that in Syria reeds grow that are full of honey, which be understood to be sugar. These reeds were cultivated by the inhabitants of the country. This plant, he says, 'is cultivated by the Jews, the Moslems, and the Christians alike; and at the time of harvest they bruise it, when ripe, in a mortar, and set by the strained juice into vessels till it is concreted in the form of snow or of white salt. This, when scraped, they work with bread, or rub it with water and take it as potage; and it is to them more wholesome and pleasing than the honey of bees.'

It is very difficult to trace the progress made in introducing the sugar-cane, and the process of extracting sugar from it, into the islands of the Mediterranean, into Italy, and into Spain; but most authorities agree that these benefits were derived from the Arabs, and were in some degree affected with the Crusades. About 1240, according to the Crusades, M. Culloc color, while he admits that the Crusades tended to spread a taste for sugar through the Western world, considers that there can be no doubt of its introduction in the Middle Ages. Macpherson, in his treatise on sugar, observes that 'of the numerous authors who have treated of sugar, William Falconer, the Falconer, and Wilkins, in particular, are the earliest in this country who have treated of sugar;' and adds, 'in a note, that Falconer did not know that it had been cultivated in Sicily long before.
Having been cultivated in modern Europe antecedently to the era of those expeditions, as well as imported by the Portuguese, the inhabitants of Amahlí, and others, who carried on a commerce with St. Thomas, Madeira, and other islands in the Levant. Dr. Moseley states, on the authority of a French 'Essai de l'Histoire du Commerce de Venise,' that sugar was certainly imported into Venice as early as 965, and in varied-weight, but under the fourteenth century in Sicily; but, according to the account given by Leflaive, a Jesuit, it must have been before 1166: for he states that in that year William II. king of Sicily, made a gift for grinding sugar-canes, with all its rights, members, and appurtenances, to the monastery of St. Clement. The Venetian historians in fact that in the twelfth century Venice could import sugar cheaper from Sicily than from Egypt. The manufacture of sugar was probably introduced into Spain by the Moors, some time in the fourteenth century. The cane is supposed to have been first planted in Valencia about the year 1278, and in Murcia. A very interesting account of the sugar manufacture, as practised in Valencia in 1664, is given by Mr. Francis Willughby, an English traveller who visited Spain in that year. (Ray's Travels, second edit., 1728, vol. i., p. 490, &c.) About 1420 the Portuguese took the sugar-cane from Sicily to Madeira, and, probably during the fifteenth century, it was carried from Spain to the Canaries. Anderson relates, under the year 1563, on the authority of Morsicano, that there were between the Canaries and Madeira, there arrived two Zealand ships at Campveer, laden with Canary sugar. 'From these origins,' adds Dr. Moseley, 'the cultivation of the sugar-cane, and the art of making sugar, spread itself over different parts of Europe to the West Indian islands and the Brazil.'

It would be tedious to enter into an examination of the confused accounts which we possess of the gradual extension of the culture and manufacture of sugar on the continent and islands of the western hemisphere, or to repeat the equally confused and often contradictory statements of those writers who have examined the question as to whether the sugar-cane was or was not indigenous to the New World. Much may be found on this subject in the treatises of Moseley, Ray, Duhamel, and the latter, in his 'Natural History,' gives all the information which can be obtained from the authorities. The plant may be supposed to have been cultivated in some cases as an esculent garden vegetable, the stem being eaten, or rather sucked or chewed, in a raw state, after being simply peeled, before it was cultivated for the purpose of manufacturing sugar. Wherever the sugar-cane may have been indigenous, there is no reason to question the fact that the manufacture of sugar, derived originally from China and India, was introduced into the western world. The following table contains some information respecting the production of sugar in the sixteenth and seventeenth centuries will indicate the changes which the trade in this important article has undergone.

Hispанииca, or St. Domingo, as early as 1518, was planted, as is established by the Spaniards. Peter Martyr, who gives this information, remarks on the extraordinary growth of the cane in that island; which, for a long period, afforded the principal supply of sugar to Europe. Hawkins brought sugar from Hispaniola to England in 1563. Anderson, in an account compiled from Guicciardini, of the commerce of Antwerp about the year 1560, states that Antwerp received sugar at that time from Spain,—which had it from the Canaries; and also from Portugal, the latter country deriving it from St. Thomé, or St. Thomas, and other islands on the African coast, and from Madeira. Sugar was also an article of import from Barbary.

In the island of St. Thomas, just alluded to, sugar was made, according to Moseley, much earlier than in the West Indies. He states, on the authority of Dapper, that the Portuguese had sixty-one sugar-works in the island, before the Dutch destroyed them in 1610. A few years later, Heylin, in his 'antique History,' speaks of forty ships that were annually loaded with sugar from this island; for the production of which there were seventy 'ingenios,' or sugar-houses, employing from 200 to 300 slaves in each. Whatever may have been the vigorous and rapid growth of the commerce of the English sugar-manufacture in Barbadoes, Anderson states that in 1627, and for several years later, the Portuguese supplied most parts of Europe with Brazil sugars. About 1650 the British planters in Barbadoes appear to have been realizing property very rapidly by the raising of sugar, they having obtained, a few years before, valuable information from Brazil respecting the culture and process of extracting sugar from the cane. In 1670 Sir Josiah Child (quoted by Anderson) alluded to the decline of the Portuguese trade in this product, and states that 'most of their Muscovado and Panama sugars quite out of England; and their whites we have brought down in all these parts of Europe, in price, from seven and eight pounds per hundredweight, in these latter years, to five and six shillings.' And we have also much lessened their quantities; for whereas formerly their Brazil fleets brought one hundred to one hundred and twenty thousand chests of sugar, they are now reduced to about thirty thousand chests, since the great increase of Barbadoes has been noticed. Collet states that in 1676 the sugar trade of Barbadoes is said to have attained its maximum, being then capable of employing 400 vessels, averaging 150 tons burden. [Sugar Trade, p. 237.]

Cultivation of the Sugar-Cane.—The botanical characteristics of the sugar-cane are found in the Appendix of this work.

The height attained by the canes, their colour, the length of their joints, and many other particulars, vary with different species, with the character of the soil, and with the treatment of the plant. The size of the sugar-cane is various, and its height in different soils may vary from eight feet up to twenty feet, and are divided by prominent annular joints into short lengths. Long narrow leaves sprout from each joint; but as the canes approach maturity, the Vines are changed into roots. The outer part of the cane is hard and brittle, but the inner consists of soft pith, which contains the sweet juice; this juice being elaborated separately in each joint, independently of those above and below it. The canes are usually propagated by slips or cuttings, consisting of the top of a cane, with two or three of the upper joints, the leaves being stripped off. These are planted either in holes dug by hand, or in trenches formed by a plough, about eight to twelve inches deep; the earth being banked up upon the margin, and well manured. When it is required to plant on a steep slope, it is recommended, so that the earth may be thrown up on each side of the trench. The distance between the holes or trenches must be such as to afford free access of air to the plants, and convenient space for the labourers employed in tending them and clearing the ground from weeds. Three feet between the rows, and two feet between the holes in the rows, is about the minimum; but when the horse-hoe is used to keep the ground clear from weeds, the above distances must be increased. The general state of the culture of the sugar-cane will be found in the Appendix of this work. In this matter however there is much difference on different plantations. Two or more slips are laid longitudinally at the bottom of each hole, and covered with earth from the surface and banks. In some the plants are sown in beds, the night the sprouts appear a little above the earth, and then a little more earth from the bank is put into the hole; and as the plants continue to grow the earth is occasionally filled in, by a little at a time, until, after four or five months, the holes are entirely filled up. The time required for bringing the canes to perfection varies much under different circumstances; and many planters disregard system as to the time of planting, performing that operation rather at the most convenient than at the most seasonable time. From August to November is however generally considered the best time for planting in the British West Indies; and about March and April is perhaps the most generally approved time for cutting the canes, although that operation is sometimes performed through a great part of the year, and the cutting of the cane is indicated by the skin becoming dry, smooth, and brittle; by the cane becoming heavy; the pith grey, approaching to brown; and the juice sweet and glutinous. The canes which grow immediately from cuttings are called rastions. The rastions are not so vigorous as the original plant canes, and are of a better sugar, and that with less trouble in clarifying and concentrating the juice. The old practice of the West Indian colonists was to plant one-third of the cane-grounds every year, so as to have one crop in each season, but latterly more dependence has been placed upon rastions. Some planters have, under favourable
erucentances, raised rattoon crops for more than twenty years successively, from the same soils. The canes should be cut as early, and as short as possible, and where the raw juice is found in the lower joints; and, after cutting them, it is considered well to cut the stumps down a few inches below the surface of the ground, and to cover them up with mould. One or two of the top joints of the cane are cut off, and are allowed to remain covered with mould, which is tied up in bundles, and carried immediately to the mill. The upper branches of the cane are used as food for cattle; and the remainder of the waste forms a valuable manure, for which purpose the trash or waste from the mill is admirably suited, though much of it is usually consumed as fuel.

The sugar-cane is liable to the attacks of many destructive insects; of which a minute account was communicated to the Society in 1802. In 1804, the Rev. Edward Dowdun Guilding, of Kingston, St. Vincent, in the West Indies, which, with plates of some of the insects, was published in the forty-sixth and forty-seventh volumes of the Society's Transactions.

Preparation of Raw or Muscovado Sugar.—The operation of cutting the canes is so adjusted as to keep pace with the action of the mill by which the juice is to be pressed out; so that the canes may be crushed or ground while quite fresh, and the canes and implements of the mill are most conveniently used; some of them resembling mortars, formed of the lower part of the trunks of trees, in which the canes are crushed by the rolling motion of a pestle, which rests in an inclined position against the side of the mortar, and which is worked by a laborer connected with it. The expressed juice runs off by a hole bored obliquely from the lower part of the mortar-like cavity, and is conducted by a spout to a vessel placed to receive it. In order to make a crop a mill effective, it is necessary to cut the cane into very small pieces. Dr. Ure gives engravings of two of these machines; in one of which the driver of the oxen, and in the other the man who feeds the mill also, rides upon the horizontal bar attached to the post. The wheels are not portable; the stump at which the mortar is formed should be firmly fixed in the ground. Others are capable of being moved from place to place, so that they may accompany the movements of the cane cutters. One of these consists of two vertical rollers of hard wood, having, near their upper ends, endless screws, or spiral ridges, so fitting into each other that both rollers may revolve when rotary motion is applied to either. These are mounted in a strong frame, which is placed on any piles in the ground, and wedge-shaped or raised plates are used to regulate the position of the bearings or axes of the rollers, so as to adjust them to a greater or less distance apart. The axis of one of the rollers is prolonged vertically above the frame, and carries a beehive-shaped or round yoke, which is placed near the edge of which the canes are in contact with the lower rollers, which are also very near together. They are mounted in an iron framing, resting upon a massive foundation of masonry, and having the necessary provisions for adjusting the relative position of the rollers. The two lower rollers, which are called respectively the feeding and delivering rollers, have small flanges at their ends, between which the top roller is placed, so that the pressed cane, or bagasse, may not be able to escape through the gap; the feeding or driving rollers are made from two inches and a quarter to two inches and a half thick, and are generally fluted, sometimes in a diagonal direction, to enable them the better to seize the cane from the feed-board. It is however, observed by Dr. Ure, on the whole considered better to flute the feeding roller only, leaving the top and delivering rollers plain.

When the top roller is fluted, it should be very slightly, for after the work of a few weeks, its surface becomes sufficiently hard and rough to prevent the disadvantages of fluting the delivering roller in the grooves carrying round a portion of the liquor, which is speedily absorbed by the spongy bagass, as well as in breaking the bagass itself, and thus causing great waste. The feeding or driving rollers are similarly fluted, at the edge of which is near in contact with the feeding roller. The space between the feeding roller and the top roller is usually about half an inch; but the space between the latter and the delivering roller is much less. The delivery board, which receives and conducts away the trash of the cane, is also of cast-iron, sloping downwards from the delivering roller, with which its edge is in close contact, so that it may detach any portions of trash or bagass that may adhere to the delivering roller, and which, if not detached, would become mixed with the expressed liquor. The rollers are set in motion by toothed gear, and suitable channels and receptacles are provided for receiving and conducting away the trash, which is partly carried away by the brewing gutter of the mill-bed by pumps connected with and worked by the machinery of the mill; but it is essential that such pumps should be worked very slowly, lest the agitation of the liquor should favour fermentation. Where circumstances render such an arrangement impracticable, labour may be saved by placing the crushing-mill on a high level, so that the liquor may run from it to the vessels in which it is to be purified, by inclined gutters. The dimensions given by Dr. Ure to the sugar-mills of the West Indies, worked by steam-engines of from eight to twelve horse-power, are, length of rollers, four feet to four feet eight inches, and diameter from twenty-five to twenty-eight inches. The surface speed of the rollers is 3' or 3'6 feet per minute. The length of the mill varies according to circumstances; but it is stated that in Demerara a well-constructed engine and mill will produce the ends of the canes are then turned, either by another negro on the opposite side to the feeder, or by a framework of pulleys and engines, on which are suspended balls of rope. The ropes are then pulled to rise and fall again between the second and third rollers. As these are placed nearer together than the first and second, they compress the canes still more, so that on leaving them they are reduced to the form of dry spindle-like canes. These are used as fuel in heating the vessels for evaporating the juice. Channels are added to receive the liquor expressed from the canes, and to conduct it to the vessels in which it is to undergo the succeeding operations.

The construction of this mill is very defective, since it is impossible to supply the canes to the rollers in so uniform a layer as to prevent them crossing each other. They become therefore unnecessarily crushed and broken, so that the liquor is partly retained in the rivets, and is often sent off irregular and destructive waste. These evils are obviated by the improvement of placing the rollers in a horizontal position, and feeding the mill by sliding the canes gradually from an inclined board. The rollers are made very accurately of cast-iron, hollow, and fluted or grooved on the surface. Such improved sugar-mills have been described and represented by Professor Barlow, in the treatise on Machinery and Manufactures, forming part of the 'Encyclopædia Britannica.' Perhaps the best description of a Sugar-Cane, and by Dr. Ure, in his 'Dictionary of Arts,' &c.; from the latter of which works the following description is condensed. The three rollers are not placed in the same plane, but are arranged in a triangular form, so that the periphery of the lower roller is in contact with the two lower rollers, which are also very near together. They are mounted in an iron framing, resting upon a massive foundation of masonry, and having the necessary provisions for adjusting the relative position of the rollers. The two lower rollers, which are called respectively the feeding and delivering rollers, have small flanges at their ends, between which the top roller is placed, so that the pressed cane, or bagasse, may not be able to escape through the gap; the feeding or driving rollers are made from two inches and a quarter to two inches and a half thick, and are generally fluted, sometimes in a diagonal direction, to enable them the better to seize the cane from the feed-board. It is however, observed by Dr. Ure, on the whole considered better to flute the feeding roller only, leaving the top and delivering rollers plain.

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about a hundred gallons of liquor per hour for each horsepower.

Cane-juice, as expressed by the mill, is an opaque, slightly viscid fluid, of a dull grey, olive, or olive-green colour, of a sweetness extremely variable, ranging from 1°033 to 1°106. It holds in suspension particles of solid matter from the cane, a considerable portion of which is separable by filtration or repression. This solid matter consists of fragments of the cellular parenchyma of the cane, its fibres and bark, mixed with a very abundant greenish substance, like that called chlorophyce by chemists, which forms the colouring-matter of leaves. The juice is so exceedingly fermentable, that in the climate of the West Indies it would only take two or three hours after leaving the mill, if the process of clarifying were not immediately commenced. As this would be extremely injurious, it is very important so to proportion the size of the clarifying apparatus to the power of the mill, that the juice may be conducted immediately to it, as fast as it is expressed from the canes.

The processes followed in the East Indies for separating the sugar from the cane-juice are very tedious and imperfect, and may be dismissed with a very brief notice. The liquor, after being strained so as to separate the coarser feculencies, is boiled down in a range of open boilers heated by a long flue, into a thick insipissated juice, the scum which rises during the operation being removed. When it is cool, and in this it becomes a dark colour, soft, viscous mass, called goor, or jaggery. Sometimes a little quick-lime is added to the juice before boiling, which, by partially neutralizing the acid of the cane, puts the juice into a coarser clot and subjecting it to pressure. The sugar, which in this state is called shucker or hank, is further purified by boiling it with water, with the addition of an alkaline solution and a quantity of milk. When this has been continued until all signs of reduction are removed, the mixture is washed, and afterwards transferred to earthen pots or jars, wide at the top, but coming to a point at the bottom, which is perforated with a small hole, that, at the commencement of the operation, is stopped with the stem of a plantain-leaf. After it has been left for a few days to granulate, the holes in the pots are unstopied, and the molasses drains off into vessels placed to receive it. The sugar is rendered still purer and whiter by covering it with thin layers of a fine dressed flour, which serves to protect it from the moisture which forms slowly through the sugar, and carries with it the dark-coloured molasses. After several days, the leaves are removed, and the upper part of the sugar is spread over the finger, which is held in the sun. Fresh leaves are then added, by which another layer of sugar is whitened in like manner; and the operation is repeated until the whole mass is refined. The sugar thus prepared is called cheree, and is that which is commonly brought to England.

A similar process to the above is said to be practised in Cochín China, by making a pile of brown sugar and of slices of the cellular part of the plantain stem, in alternate layers. The colouring-matter of the sugar is thus absorbed by the plantain leaves, leaving the sugar very pure and white. From sugar so prepared the fine white sugar-candy of that country is made.

The separation of the sugar from the cane-juice is effected in a much simpler manner in the West India colonies. The juice is conducted by gutters from the mill to one or more large flat-bottomed copper pans or open pans, called clarifiers, which usually contain from three hundred to four hundred gallons each, but sometimes as much as a thousand gallons. Each of these clarifiers is placed over a fire, and is either regulated or extinguished by a damper; and each is supplied with a stopcock or siphon for drawing off the liquor. When the clarifier is filled with juice, a little slack lime is added to the juice. The juices are then all put together in vessels previously mixed with a little cane-juice to the consistence of cream. The quantity of lime varies with different juices, and should be very carefully adjusted, as too much is very injurious to the sugar. Dr. Ure remarks, respecting this process, "If an albuminous emulsion be used to promote the clarifying, very little lime will be required; for recent enule-liquor contains no appreciable portion of acid to be saturated." In fact, he proceeds, the lime and alkalis in general, when used in small quantity, seem to coagulate the matter of the juice, and to contribute to the rising of the liquor; but if an excess of temper be used, the gluten is taken up again by the strong affinity which is known to exist between sugar and lime. Excess of lime may always be corrected by a little alum-water. Where the juices goor so strongly, and the charred sweetness and the saccharine matter gets so thoroughly elaborated, and the glutinous mucilage so completely condensed, that a clear juice and a fine sugar may be obtained without the use of lime or acid. As the juice boils, and becomes much hotter, the solid portions of the cane-juice coagulate, and are thrown up in the form of scum. The heat should be urged nearly to the boiling-point, but the liquor in the clarifier should not actually boil. Porter says it should never exceed a heat of 210° Fahr. The proper heat is indicated by the scum rising in blisters and breaking into white froth, which commonly happens about forty minutes after the fire is lighted. The damper is then closed, and the fire dies out; and after an hour's repose, the liquor is removed for the first to the evaporating pans. It is drawn off either by a cock or a siphon, in such a manner as not to disturb the scum, which subsides broken, and is removed from the clarifier before another charge of cane-juice is put into it. The clarified juice is then transferred to the largest of a series of evaporating copper pans, or panns, three or more in number, in which it is reduced in bulk by boiling. The largest of these panns is of the largest sufficient size to receive the whole contents of the clarifier; but the smaller ones become gradually smaller, on account of the diminished bulk of the liquor, by evaporation, as it is removed into each of them in succession. These evaporators are placed on a long flue, heated by a fire at one end, on which the smallest of the copper, called the teache, is placed. In the process of boiling, impurities are thrown up in the form of scum, which is carefully removed; and sometimes that from the smaller pans is allowed to return, by a channel provided for the purpose, to the last pann. Copper. If, during the evaporation, it be perceived that the liquor is not sufficiently clear, some lime-water is added to it, for the same purpose as the temper was originally applied to the juice in the clarifier. In the last and second last of the evaporating copper, called the teache, the liquor is boiled down to a thick consistency as is considered necessary for granulation; this point being most commonly ascertained by observing to what length a thread of the syrup may be drawn between the thumb and finger; to which it is then removed to a pann called the sugar-fraying pan.

For this purpose a drop of the syrup is taken between the thumb and forefinger, and drawn into a thread until it snaps sunder. When it has done so the portion suspended is thrown out, and the thread is so taken up as to be of much less length, according to the degree to which the syrup has been evaporated. The proper state is indicated by a thread of from half an inch to a quarter of an inch long. This trial by the touch, whence the teache is supposed to derive its name, is very imperfect; for it sometimes happens that the syrup may have the required tenacity, and yet not be in a good state for crystallizing. The latter point may be better ascertained by observing the ineipient granulation of the syrup on the back of a lady's hand dipped in the teache. More perfect tests have been suggested, but Dr. Ure observes, that tenacity and granular aspect will continue to constitute the practical guides to the negro boiler, till a less barbarous mode of concentrating cane-juice be substituted for the present naked teache, or sugar-fraying-pans. He adds the following remarks, illustrative of the evils of this practice:—"That weak sugars are such as contain an inferior proportion of carbon in their composition was first deduced by experiment from various tests of vegetable and animal bodies, an account of which was published in the Philosophical Transactions of the Royal Society for 1822. Since then Dr. Prout has arrived at results confirmatory of my views. See Philosophical Transactions for 1823. In the mean time the best refined sugar, to contain 42°85 parts of carbon per cent.; East India sugar-candy, 41°9 parts; East India raw sugar in a thoroughly dry state, but of a low quality, 40°98; mann sugar, or refined; sugar from dyed bones, 39°54; sugar from starch, 39°66; hence, by
curarelising the syrup in the teache, not only is the crystallizable sugar blackened, but its faculty of crystallizing is impaired, and the granular portion is rendered weaker. The sugar is removed too early from the cooler, and is secondarily crystallized, and the sealed vessels are treated as if they were a sure guide in determining the proper moment for stirring, or emptying the teache, because a viscous syrup, containing much gluten and sugar, altered by time, requires a higher temperature to enable it to granulate than a pure saccharine mixture.

The concentrated syrup is laded, or shipped, from the teache, either immediately into open wooden boxes called coolers, or into a large cylindrical cooler, about six feet wide and twelve deep, from which it is afterwards transferred to the smaller coolers, or rather crystallizing or granulating vessels. The latter plan seems preferable, because when successive portions or skippings of syrup are poured into the same vessel, the saccharine particles of one portion agglomerate, and so much are retained in the precedingings, so that a larger production is made. The smaller wooden coolers, of which there are commonly six, are usually rectangular, about seven feet long, five or six wide, and one deep.

The large mass of sugar in each cooler is favourable to the production of large crystals, because it occasions the syrup to cool very slowly.

In the last-mentioned vessels the sugar is brought to the state of a soft mass of crystals, imbedded in molasses, or thick crystallisable syrup. This fluid is the next part of the process, and is performed in a building called the curing-house. This is a large building, the floor of which is excavated to form the molasses reservoir, which is lined with sheet-lead, boards, or osier. A central eastern is an arrangement upon which stand a number of empty casks, or sugar hogs-heads, called potting-casks. Each of these has eight or ten holes bored through the lower end, and in each hole is placed the stalk of a plantain-leaf, which is long enough to descend a few inches below the level of the joints, and to rise above the top of the cask. The soft concrete sugar is removed from the coolers into these casks, in which the molasses gradually drain from the crystalline portion, percolating through the sponge plantain-stalks, which contain so many drains to buoy the liquid to the eastern extremity. With sugar of average quality three or four weeks is sufficient for this purpose, but sometimes a longer time is necessary. If the sugar be removed too early from the cooler, which Porter thinks is often the case, a portion of crystallizable syrup is lost, by its running away with the molasses. Most accounts describe the curing-house as an airy building; but Dr. Ure says that it should be close and warm, to favour the liquefaction and drainage of the viscid caramel.

When it leaves the curing-house the sugar is packed in hogsheads for shipment as raw, brown, or muscovado sugar, and in this state it is commonly exported from West Indian colonies. As the molasses is very imperfectly separated from the crystallized sugar, a considerable diminution of weight takes place subsequent to the shipment, by the drainage from the hogsheads. This waste has been estimated to amount to no less than 19 per cent, or more than 27,000 tons annually, upon the sugars of the British colonies. The loss upon French colonial sugars used to be much greater even than this. Dr. Ure states, on the authority of DuTrone, that of 120,000,000 lbs. of raw sugar which were annually shipped by the planters of St. Domingo, only 96,000,000 lbs. were landed in France; the loss by drainage amounting to 20 per cent. Means have been recently adopted in some colonial sugar-works for reducing this loss; but they may be better described after treating of the superior kind of raw sugar called clayed sugar.

Clayed sugar, which is also called Lisbon sugar, is raw sugar that has been subjected to an operation similar to that which has been practised in the notice of East India sugar, as practised in the preparation of cheme. The sugar is removed from the coolers into conical earthen moulds called formes, each of which has a small hole at the apex. These holes being stopped up, the formes are placed, apex down, in the earthen vessels, and the syrup being stirred round, is left for from fifteen to twenty hours to crystallize. The plugs are then withdrawn, to let out the uncrystallized syrup; and, the base of the crystallized lump being removed, the forme is filled up with pulvurised white sugar. This is well pressed down, and then a quantity of clay, mixed with water, is placed upon the sugar, the forms being put into fresh empty pots. The moisture from the clay, filtering through the sugar, carries with it a portion of the colouring-matter, which is more soluble than the sugar, and the clayed sugar is then repeatedly re-wetted or renewed, until, after about twenty days, the loaves or sugars are sufficiently purified to be removed from the formes. They are then dried gradually in a stove, and crushed into a coarse powder for market. The operation of claying the sugar improves the quality of the sugar. It was however very generally practised by the French in St. Domingo, where four hundred plantations adopted the process.

A similar process to the above, so far as regards the results, was adopted in the West India colonies, in the 18th. C. In 1816, for England, and in 1838 for the colonies. It consists in submitting the raw sugar, after being cured in the usual way, to the action of a vacuum filter. The apparatus consists of a shallow vessel, beneath which is a cavity or reservoir, connected by an air-pump. The bottom of the vessel is perforated with a number of small holes; and when a quantity of muscovado sugar, mixed with a little water into a pasty mass, is laid in it, upon a piece of haircloth, the air is withdrawn by the air-pump. The superintensive atmosphere upon the surface of the sugar then drives the moisture, and with it much of the colouring-matter, through the holes in the bottom of the vessel. When the sugar is sufficiently white, the air-pump is stopped, the sugars and loaves are removed, and a fresh charge of muscovado is applied. Mr. Porter states that this process has been applied with advantage in the colonies, and that it is likely to supersede claying. He considers that it may lead to economy not only by preventing the loss by drainage, but also by bringing the sugar to so dry a state that it might be packed in bags, like East India sugar, instead of casks. It is also important for effecting a saving of time in the preparation of sugar for shipment. Besides its use in the colonies, this process has at last been applied to raw sugars in England, as the first step in the refining process.

Somewhat similar to the above is the plan patented by Mr. John Taylor for expelling molasses from raw sugar by the application of very powerful pressure; water or lime-water being previously mixed with the sugar in the proportion of one-eighth to one-tenth of its weight. This plan, according to Porter, is not equally efficient with that of clayed sugar.

Another means of avoiding the loss consequent on the drainage from raw sugar during its voyage to its country, and that occasioned by the repeated solution of the sugar, which weakens its grain, is the importation of sugar for the use of the sugar-refiner, in the form of a concentrate containing nearly half its weight of granular sugar along with more or less molasses, according to the care taken in the boiling operations. Dr. Ure appears very sanguine as to the result of this plan, observing, 'Were this mode of treatment generally adopted, I am convinced that 30 per cent. would be added to the amount of home-made sugar-loaves corresponding to a given quantity of average cane-juce; while 10 per cent. would be taken from the amount of molasses.' The saving in labour in the colonies, by which the produce of the cane may be exported five or six weeks earlier than is usual, is also important. It had been feared that the syrup would undergo some chemical change during the voyage; but Dr. Ure states that among more than a generality of general samples which he had analysed for the Custom-house, he had not perceived any traces of fermentation. He adds, however, that it does not appear that our sugar colonists have availed themselves of the proper chemical method of counteracting that in the fermentations of the cane-juice which sometimes supervenes, and proves so injurious to its products. A very slight muting, or impregnation with sulphuric acid, such as might be given by burning a sulphur lamp, or turning in a small quantity of the syrup, which, according to Mr. Taylor, would, he says, suffice for the most fermentable cane-juice; and the sulphuric acid might be driven off by heating the cane-juice in the clarifier before adding the temper-time, so as to prevent the introduction of caustic and sulphurous spirits into the molasses. A like process is adopted successfully with grape-must.
Sugar-refining.—Raw or muscovado sugar, as brought from the colonies, forms the common moist or brown sugar of the shops. The saccharine particles are always mixed with other matter, which imparts to the sugar a dark colour, a moist clammy feeling, and an empiryaceous odour. The impure matter must be removed before sugar can be used. This is partly done by the previous boiling, and particularly by caramel.

The object of the sugar-refiner is to remove these impurities, so as to obtain the sugar in the hard white semi-transparent state known as loaf-sugar.

Loaf-sugar is a product of refining sugar, as well as that of extracting it from the cane, is supposed to have been brought to Europe from the East, probably from China; but at what time is uncertain. The Venetians are believed to have been the earliest sugar-refiners in Europe; and it is known that they practised their art. In 1777, in his 'Annals of Commerce,' Mr. Johnson says, that in 1292 loaves of sugar were sold in Scotland at the price of 1s. 9d. (more than an ounce of standard silver per lb.) Heyluyt, in his 'Cosmographie' (in the account of the island of St. Thomas), speaks of the art of refining as 'first found out by a Venetian in the year 1276,' and that he 'crowned by the invention;' but this often-repeated statement gives little information, and cannot be received as conclusive as to the invention. It appears however that the Venetians originally operated upon the coarse black sugar brought from the East. The sugar, after being converted into sugar-candy before they made loaf-sugar.

Stow's 'Survey of London' states that sugar-refining was commenced in England about 1544. There were then two sugar-houses in London, but they yielded little profit, because the sugar imported from Antwerp was so much cheaper that the supply refined sugar to England better and cheaper than it could be made at home. Subsequently, the commerce between England and Antwerp being stopped, these two sugar-houses became so profitable, that many other persons embarked in the business. Moseley says that in 1596 Sir Thomas Midd-}


to the pretext that frauds were practised in refining sugar, petitioned Queen Elizabeth for a licence for an exclusive privilege to refine sugars for a term of years; for which monopoly he offered to pay an annual sum. His petition was rejected. 'And,' Moseley adds, 'England, which formerly had been supplied with refined sugar from Antwerp, the chief commercial city then in Europe, now not only supplied itself, but supplied others for profit. It became so profitable, that many other persons embarked in the business. Anderson was therefore mistaken in supposing that the first account of sugar-refining in England was that in a pamphlet printed in 1659, which he quotes under that year for a notice of the process. All the sugar-refining operations have undergone of late years more important changes than that of sugar-refining. As generally practised until recently, the process commenced by mixing the raw sugar in a large open copper with lime-water, and adding to the mixture when warms a quantity of bullock's blood. The heat occasioned the serum of the blood, which consists chiefly of albumen, to coagulate, and in so doing to collect most of the impurities floating in the liquor, and to raise them with it to the surface of the syrup in the form of a thick scum, which was carefully removed. This clarifying process was sometimes repeated with a fresh quantity of blood, or, as it is technically called, spice. When the liquor was thus rendered tolerably clear, it was further cleansed by passing it through a filter of thick woollen cloth, which detained any particles of scum that might have been left after skimming the liquor. It was afterwards concentrated by boiling in a similar way to the refinement of the domestic press; after which it was formed into loaves in the manner hereafter described. For loaves of the finest quality a second refining followed this; the loaves produced by the first operation being broken and re-dissolved, either into cold water or lime-water; the solution was then left to stand, the dung, or egg beaten up with sugar and water: this, being almost pure albumen, acted in a similar way to the serum of the blood, and threw up a greyish scum. A small quantity of indigo, finely powdered and mixed with syrup, was then added; the effect of which was to throw up a slight scum, and by its colour to neutralize the yellow colour of the liquor. The same processes of filtering, concentrating, and pouring the syrup up into moulds, follow in this as in the case of single-refined sugar.

In the preceding section allusion has been made to the methods of separating molasses from raw sugar by the vacuum-filter and the hydraulic-press, both of which have been applied to the preparation of single-refined sugar. Mr. Johnson (Annals of Commerce, vol. ii. p. 25, note) says that it appears, from the accounts of the chamberlain of Scotland, published from the originals in the Exchequer, by John Davie, Esq., that in 1529 loaves of sugar were sold in Scotland at the price of 1s. 9d. (more than an ounce of standard silver per lb.) Heyluyt, in his 'Cosmographie' (in the account of the island of St. Thomas), speaks of the art of refining as 'first found out by a Venetian in the year 1276,' and that he 'crowned by the invention;' but this often-repeated statement gives little information, and cannot be received as conclusive as to the invention. It appears however that the Venetians originally operated upon the coarse black sugar brought from the East. The sugar, after being converted into sugar-candy before they made loaf-sugar.

Stow's 'Survey of London' states that sugar-refining was commenced in England about 1544. There were then two sugar-houses in London, but they yielded little profit, because the sugar imported from Antwerp was so much cheaper that the supply refined sugar to England better and cheaper than it could be made at home. Subsequently, the commerce between England and Antwerp being stopped, these two sugar-houses became so profitable, that many other persons embarked in the business. Moseley says that in 1596 Sir Thomas Midm-
clayed sugar. In this case the purification may be rendered more complete by the filtration of moisture from a magma of sugar (a mass of wet sugar in a state resembling moria), applied in the same way as that of clay in the claying process. Sometimes also a little blood is mixed with the sugar in the blow-up cistern; or, instead of it, a mixture of gelatinous alumina and gypsum, called finings, prepared by adding a solution of alumina to a body of lime and water, and collecting, washing, and draining the precipitate upon a filter, is used. Other refiners use both the blood and finings. The bone-black, in the state of very fine powder, is also, by some refiners, mixed with the sugar in the blow-up cistern, in the proportion of from 5 to 20 per cent of the whole, instead of being used in the manner first described. Dr. Ure, who mentions this order of procedure, states that the liquor which first passes through the bag-filter is generally tinged a little with the bone-black, and must therefore be pumped back into the upper cistern for refilteration. He adds that, in cold weather, the case containing the bag-filters may be kept warm by steam-pipes. Aikin observes that, from experiments on the mode of action of animal charcoal in the manufacture of beet-sugar, it appears not only to attract to itself the colouring-matter, and to destroy the peculiar flavour by which one kind of sugar is distinguished from another, but also to have the property of removing much of the mucilage, and thus facilitating the crystallization of the pure saccharine part. He states also that it has been used with great advantage in clarifying the cane-juice itself, and thus obtaining a raw sugar nearly equal to brown-sugar.

In the evaporation or concentration of the clarified syrup, which forms the next part of the refining process, improvements of the greatest importance have been effected. In the old plan of concentrating the syrup in open pans, they were heated by fires to a temperature of from 230° to 250° Fahr. Many plans were contrived for rendering the application of heat more regular and controllable, by the intervention, between the fire and the evaporating pans, of fluids which, under the ordinary atmospheric pressure, cannot be raised above the proper temperature; by heating the pans by means of steam-pipes; or by some similar contrivance. The most valuable invention of all appears to be that patented in 1813 by the Honourable Edward Charles Howard, and now extensively used under the name of Howard's vacuum-pan. It is well known that fluids will boil at a much lower temperature in a partial vacuum than when exposed to the ordinary pressure of the atmosphere; and by the happy application of this principle, Mr. Howard removed the chief difficulties attending the evaporation of saccharine syrup. The accompanying cut, which represents one of the vacuum-pan used at the refinery of Messrs. Fairrie, may assist in the explanation of this admirable contrivance. The apparatus consists of a close copper vessel, a, b, the several parts of which are united by flanges, with packing between the joints to render them perfectly air-tight. The middle portion of this vessel, a, is cylindrical, and from six to seven feet in diameter, and the upper part, b, is convex or dome-shaped. The bottom of the pan is also convex, but in a less degree, being part of a larger sphere. The whole is supported upon legs, so that every part may be readily in-

expected. The bottom of the pan is double, the cavity between the inner and outer bottom forming a receptacle for steam, the admission of which raises the contents of the pan to a temperature probably 15° higher than the boiling temperature of water. Their movements have also a spiral coil of copper pipe a little above the inner bottom, about on a level with the lower flange, or bottom of the cylindrical part of the vessel, by which steam may be forced in by the action of the boiling syrup and ascends through the body of syrup in the pan, and thereby to greatly assist in the evaporation. The outer cavity is supplied with steam generated at a low pressure; but the spiral pipe contains steam of high pressure, and consequently of great heat. c is a small cavity called the steam-chamber, through which the outer air, the centre of the means of the bent tube and apparatus seen behind the pan, a communication is formed with an air-pump, by which the pan may be partially exhausted of air. A communication is also formed between the interior of the pan and a vessel containing clarified syrup; and apparatus connected with a lower end of the bottom of the pan, with a vessel in the room below, which receives the sugar after it has been boiled; each of these communications, as well as that with the air-pump, being supplied with valves, by which they may be opened or closed at pleasure. The pan is supplied with apparatus by which the temperature of the syrup, the rarity of the air, &c., can be readily ascertained; and it has a safety-valve to admit air in case of the air-pump acting too fast; so that the sugar is liable to be hardened for want of proper air. This apparatus is not only advantageous for regulating the temperature of the external atmosphere might become dangerous. The subsidiary parts of the apparatus may be variously arranged, but do not require further description. In using the pan, a quantity of liquid sugar is poured into it, which is heated to a temperature from a very high to one on a lower level: in the latter case, the syrup is forced into the pan by the pressure of the atmosphere, on the same principle that water rises in a common pump when the air is being formed in the pan by the action of the air-pump. The syrup is then继续 the boiling or evaporation of the syrup, motion being communicated to it from a steam-engine; and by this means the sugar is enabled to boil at a temperature of only 135° or 140°, which cannot be heated above this temperature in open pans. To enable the person who superintends the process to judge when the syrup is sufficiently evaporated, the pan is supplied with a very ingenious appendage called the proof-stick, the handle of which is shown at d. This contrivance consists of a tube extending into the body of sugar in the pan, and terminating in a peculiar kind of valve; so formed that, by turning a rod which is inserted in the tube, a sample of sugar may be taken and drawn out with the rod, and thus examined by the touch, as described in explaining the process of evaporation in the West Indies; and when it appears to be in a satisfactory state, the sugar is allowed to flow, through an opening in the bottom of the pan, into a granulating-vessel in a room below.

The important improvement of boiling sugar in vacuo made way, however, for a considerable time, but slowly. At length however the superiority of the new process became so apparent that it was extensively adopted. It is stated in the "Penny Magazine* that, in some years, the premiums paid by refiners for permission to use the patent process amounted, collectively, to more than forty thousand pounds.

The practice of boiling the syrup at a low temperature has occasioned a curious difference in the next process, which is that of granulating or crystallizing the refined or treated liquor. In the West Indies, the vessels used for this purpose are called coolers, because in them the syrup is brought down to a much lower temperature than it has received in the boiling-coopers. The corresponding vessels used in refining sugar upon the old plan were similar to these, and were called by the same name; but when the method of boiling at a low temperature is adopted, the granulators become heaters instead of coolers: the sugar, which is used in them, rising to a temperature of 160° or 190°. This is done by the admission of steam into a cavity surrounding the granulating-vessel, which is a shallow open copper or pan, in which the thick syrup (which is called violently to promote the granulation.*

*Aikin observes, respecting this process of boiling, when to make a sugar as white as possible, to use double refined sugar; after being properly boiled, were poured directly into the vessel containing the syrup, when the same was in a state of being previously wet. The sugar is now crystallized, which is purposely disturbed by the beating, would take a slower motion from being quite white would be a fine white crystal; but sugar, in so crystallizing, does not exclude the whole of the colouring-matter, nor could the taste of the maize of clay be employed, under such circumstances, with any good effect.'
It should be borne in mind that, owing to the low tempera-
ture of the interior of casts, the crystals may form at first in a
half-artificial state, crystallized before leaving it; so that the principal
object of the subsequent reheating in the granulator is to bring it into a favourable state for remove to the moulds.

To promote the formation of large crystals in the pan, it has been thought advisable to arrange a number of pans, and to cast the molasses, or other fluidity, the moulds or boxes are placed in a stove, and kept hot for several days. Perfect stillness is important during this operation, as any disturbance reduces the size of the crystals. The syrup is afterwards let off very gradually, in the form of a cone, and during this process the crystals are agglomerated together as they form upon the strings or the sides of the box or mould. Candy is more transparent and harder than loof-sugar; and its hardness renders it less soluble. Aikin observes that it is, on this account, often represented as less sweet than molasses sugar. The same reason that the latter is popularly considered less sweet than muscovado sugar; but that there appears no reason for supposing that sweetness is not the essential property of sugar. As the crystals of sugar are prepared more perfectly it is its sweetness brought out. Coloured sugar-candy is made by mixing cochineal, indigo, or other colouring-matter with the syrup; and perfumed candy may be impregnated with any desired scent in the same way.

Beet-root Sugar.—The process of manufacturing sugar from beet has been fully detailed in a previous volume [Bekx, vol. iv., p. 160]; and is also noticed in pages 234 and 235 of the present volume. Beet-root sugar is now extensively manufactured in many parts of the continent; and the process has been lately introduced in Prussia, if not entirely, to the heavy imposts upon colonial sugar. The manufacture of beet-root sugar in the United Kingdom is regulated by an act passed in 1837 (1 Vict., c. 57), and it is sold in Great Britain by the name of beet-sugar, although the latter is not produced. In Russia the cultivation of beet-root for sugar was for some time carried on very actively; but the profits not being so great as were expected, the manufacture is declining. In 1841 the number of beet-root refineries in Russia was 174, and the beet-root establishments in Prussia, and in the province of Magdeburg, was 1,600,000 cwt., and the capital embarked in buildings and machinery is said to exceed 1,000,000l. sterling, some of the establishments having cost 36,000l. The manufacturers hope that the duty on colonial sugar will be reduced, as has been the case in other countries, the importation of beet-root sugar is more extensive in France than in any part of the Continent. In 1841 the number of acres cultivated with beet-root for sugar was 145,518, and in the same year the beet-root production of Prussia was 17,924 cwt., of which one-third was manufactured in the north-eastern departments. The number of manufactories was 358, some of them provided with very costly machinery made in England. In the session of 1842 the French government proposed to reduce the duty on colonial sugar, but the interests of the beet-root sugar manufacturers were sufficiently powerful to procure an adjournment of the question for a year, and it is probable that they will demand compensation if the proposed alteration is effected.

Sugar-candy.—This is the only kind of refined sugar made in China and India; and is made of the finest quality by the Chinese, who export it in considerable quantities. Maple-sugar is made of birch-juice, or sap, the latter being fermented and the fluid thus produced subjected to a process of evaporation. It is commonly made at the time of the spring thaw, but it is also made at other times. The maple-Tree in New England, by Paul Dudley. This proves that Macpherson was in error when he stated (Annals of Commerce, vol. iv., p. 209) that the manufacture was first attempted about 1725; although for some time after that date it was carried on in a very limited way. He informs us that the difficulty of procuring supplies of West India sugar during the American revolutionary war contributed to give it more importance; and the convenient circumstances of the principal settlement in the state for the sugar, from about 1802 to 1805, when the frost, there is a scarcity of other employment, induced many of the farmers of New York and New Jersey to prepare maple-sugar, not only for their own use, but also for sale at Philadelphia, and in the northern states of North America, and refined maple-sugar was sold in Philadelphia,
was pronounced equal to any loaf-sugar made from West Indian muscovado sugar. Maple-sugar is still made for domestic use in many parts of the United States.

The sap is obtained by boring holes in the trunk, in a direction inclining upwards, with an auger about three-quarters of an inch in diameter, and at a height of eighteen or twenty inches from the ground, are said to be sufficient for an ordinary tree. Tubes of elder or sumach are inserted in the holes, so as to project a few inches from the trunk; their outer ends being cut so as to form small troughs, along which the sap is allowed to flow into receptacles below.

The season for collecting the sap extends for about six weeks, ranging between the beginning of February and the middle of April. This is done in frosty weather; yet the tendency of the juice to fermentation renders it desirable to boil down the sap at fortress within two or three days from the time of its extraction. This is done in very rude apparatus, which is carried to the encampment formed by the sugar-makers. The syrup is thus brought to about onethird of its bulk, when the higher is removed.

White of egg is sometimes used as a clarifier; and occasionally a little butter or fat is thrown in during the last boiling. The molasses are separated, though mostly in a very imperfect manner, by filtration. The concrete sugar is then washed in water, or in hot water, in taste as well as to make the solution be used, and when the molasses are well removed, the sugar is not deliquescent, as equally brown sugar from the cane. It is seldom refined, but is capable of being made equal to loaf-sugar from the cane. The composition of maple-sugar is noticed in the next article.


SUGAR. (Chemistry.) The following are the general properties of sugar obtained from different sources:

Cane Sugar.—The properties of this sugar are, that it is colourless, inodorous, of a purely sweet taste, moderately hard, and in the crystals, as when refined, as in common refined sugar, are small; but when obtained by the slow evaporation of a strong solution, they are of considerable size and prismatic in their form (sugar-candy).

The specific gravity of sugar is about 1·055: it undergoes no change by exposure to the air, and is in a solid state when molasses are heated, losing much of its weight by cold water, and combines with hot water in all proportions: a solution saturated at 230° forms, on cooling, a mass of white crystals, but at 25° still remains liquid. It dissolves five times as much as salt; and a solution is lost than in water; for absolute alcohol takes up only 1·808 of its weight, even when boiling, and this separates in small crystals as the solution cools: spirit of wine, of specific gravity 0·830, dissolves nearly one-fourth of its weight.

Sugar is phosphorescent when two pieces are rubbed together in the dark. When heated to 365° sugar melts into a viscous colourless liquid, which, when cooled slowly, becomes a transparent mass (barley-sugar): by keeping, it becomes opaque; at 400° to 420° sugar is converted into caramel by losing an equivalent of water. When exposed to a high temperature, sugar undergoes decomposition, yielding various gaseous products, and leaving a large proportion of charcoal. The acids produce very different effects upon sugar, concentrating nitric and carbonic oxides, carbonic oxalic, and saccharic acids: by sulphuric acid, when concentrated, sugar, or even a strong solution of it, is readily decomposed, sulphur and carbonic acid gases being formed; and a large and a large product in sugar: 1-1000 of a grain of sugar, on account of the large proportion of charcoal which it contains, is capable of imparting colour to an ounce of sulphuric acid. When however sugar dissolved in dilute sulphuric acid is kept for a long time at a high temperature, it absorbs oxygen from the atmosphere, and is then deposited a brown insoluble matter, which has been supposed to be identical with humus or humic acid. Hydrochloric acid dissolves sugar, and forms with it a thick black resinous paste. Although even a solution of sugar undergoes change slowly when exposed to the air, yet by the addition of yeast it undergoes fermentation, and is transformed into grape sugar, and then, as is well known, into alcohol.

Sugar in many cases combines with the alkalis, earths, and metallic oxides, and, in some cases, forms definite compounds with them. with ammonia, according to Berzelius, the sugar is precipitated by it in the form of a green salt, which, if the sugar be digested, escapes, as: leaves the sugar unaltered: potato and soda appear also: combine with sugar, and they destroy its sweetness; this is restored when the alkalis are saturated with an acid: bo. If they are burnt, the sugar becomes changed into a substance resembling gum.

Lime, barytes, and oxide of lead dissolve in considerable quantity in a solution of sugar: when the first-mentioned of these bodies, in the state of hydrate, is digested at a moderate heat in a solution of sugar, a bitter alkaline solution is obtained, in which the sugar is combined with more than half its weight of lime: Professor Daniell obtained, by the action of these bodies, gum and crystals of carbonate of lime. According to Berzelius, refined sugar and lime consists of one equivalent of double sugar and anhydrous sugar, lime, and water. The compound of sugar and barytes is similar. When hydrated oxide of lead is digested in a solution of sugar, a yellow alkaline liquid is formed, which, upon cooling, becomes a solid sugar, and but when excess of the oxide is boiled in a solution of sugar, and the liquor is filtered hot, it deposes eventually bulky masses of a tasteless insoluble compound, composed of, according to Berzelius, one equivalent of sugar and two equivalents of oxide of lead, or 42°5 sugar + 57°65 oxide of lead.

Sugar dissolves carbonate and diacette of copper, forming green solutions which are not decomposed by the alkalis, and this is also the case with the salts of iron. A crystalline compound of sugar and copper may be formed by the spontaneous evaporation of a solution of four parts of the former and one part of the latter.

According to the analysis of Berzelius, cane sugar consists of—

<table>
<thead>
<tr>
<th>Equivalent of carbon</th>
<th>72 or 64°</th>
<th>114 or 121°</th>
<th>88 or 91°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelve equivalents of carbon</td>
<td>72 or 64°</td>
<td>114 or 121°</td>
<td>88 or 91°</td>
</tr>
</tbody>
</table>

Equivalent, 171° 100°

When exposed to a high temperature, as already noticed, two equivalents of each of oxygen and hydrogen are separated: the equivalent of the remaining anhydrous sugar is of course 133.

The uses of cane sugar are too well known to require much detail: in regard to the manufacture of sugar, as well as to its consumption, it is employed to preserve various vegetable products: it is used as well as for many kinds of food, and is in these cases nutritious; but being destitute of azote, like other substances similarly constituted, it is incapable of supporting life for any length of time.

Maple Sugar, when refined, is stated to be equal in appearance and sweetnessing power to refined cane sugar: and in composition they are very similar. According to Dr. Prout's analysis, maple sugar may be considered as composed of—

<table>
<thead>
<tr>
<th>Equivalent of carbon</th>
<th>72 or 64°</th>
<th>114 or 121°</th>
<th>88 or 91°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelve equivalents of carbon</td>
<td>72 or 64°</td>
<td>114 or 121°</td>
<td>88 or 91°</td>
</tr>
</tbody>
</table>

Equivalent, 171° 100°

Beet-root Sugar, according to the analysis of Dr. Prout, is exactly similar to that of cane and maple sugar.

Grape Sugar.—Water dissolves less than 1·000 of cane sugar, but 1·04 of grape sugar, and 1·05 of muscovado sugar, even more. Alcohol is more soluble in grape sugar than in cane sugar; it forms a compound and called sulpho-saccharic acid, which gives no precipitate with any of the salts of charcoal.

According to Saussure, this sugar is composed of—

<table>
<thead>
<tr>
<th>Equivalent of carbon</th>
<th>72 or 36°36</th>
<th>14 or 70°7</th>
<th>112 or 56°57</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourteen equivalents of carbon</td>
<td>72 or 36°36</td>
<td>14 or 70°7</td>
<td>112 or 56°57</td>
</tr>
</tbody>
</table>

Equivalent, 198° 100°
Manna Sugar.—Mannite is contained in manna which
exudes from the Fraxinum Ormus and other species of sah:
the best is imported from Sicily and Calabria, under the
name of flake manna : from this the sugar is procured by
boiling it in alcohol, and as the solution cools the mannite
crystallizes: by very slow crystallization it may be obtained
colourless, in slender four-sided prisms of a milky lustre. It
has a slightly sweet taste, is very soluble in water, but the
solution is not fermentable. Mannite is also produced
during the fermentation of cane and grape sugar. It
appears to be composed of—

<table>
<thead>
<tr>
<th>SUGAR</th>
<th>36 or 39.6</th>
<th>7</th>
<th>7.6</th>
<th>48</th>
<th>52.8</th>
</tr>
</thead>
</table>

Equivalents 100°

It may be observed, that, unlike any of the preceding
varieties of sugar, the oxygen and hydrogen do not exist in
this kind in the proportions which form water.'

Honey Sugar contains two kinds of sugar, one resembles
grape sugar, and the other is uncrystallizable: the solid
sugar is obtained from honey by the action of strong
alcohol; this leaves the sugar, but dissolves the other
ingredients: by dissolving in water, treatment with animal
charcoal, and evaporation, this sugar may be obtained in a
white granular state.

Sugar of Milk, or Glycerinth, is obtained from liquor-
ice-root: it is a yellow transparent substance, extremely
sweet, very soluble both in water and alcohol, and has
a great tendency to combine with acids, bases, and salts:
its precipitation in the solutions of most metallic sales
may be observed.

Mushroom Sugar is obtained from several species of
garicaceae, &c. It crystallizes in square prisms, is colourless,
only slightly sweet, and less soluble in water than cane
sugar. It forms a red solution in concentrated sulphuric
acid.

The sugar of malted grain, and that formed artificially
from starch, have the general characters of grape sugar.

Sugar of Milk, or Lactisine, is obtained by evaporating
the milk, and generally allows the four-sided, translucent,
four-sided prisms, which are soluble in about six parts
of cold water and two and a half parts of hot: the taste of this
sugar is not very sweet, it is unattractive in the air, and is
insoluble in alcohol and water.

Sugar of Rhododen-
ron, or Glycyrrhiza, is obtained from liquor-
ice-root. It contains viscid, silky
lustre.

In its crystalized state it contains one equivalent of
water = 9.

Sugar of Diabetic Urine has the general characters of
grape sugar. [Diabetes.]

SUGAR Properties of Sugar is a proximate
principle, chiefly of vegetables, but also sparingly of animals
of the class Mammalia. It presents considerable varieties,
according to the source whence it is obtained, and is
distinguished into those which are capable of undergoing
the vinous fermentation, and into those which are not; also
into those which can assume a definite crystalline form, and
those which cannot; but sometimes those two kinds co-exist
in the same sugar. The sugar of fruit yields both the finest crystals and likewise molasses or treacle. It almost invariably exists in a dilute and liquid state in plants, but it occasionally exhibits a crystalline form in the flower of certain plants, such as the Rhododen-
ron, Ponticum, and Eucomis punctata. Sugar is the great principle by which rapidly-growing succulent parts of plants and seeds, when they germinate, are nourished. Hence it is produced in large quantities in such seeds as contain starch, which have been excited to rapid growth, as may be observed in the process of malting, which up to a
certain stage is exactly that of the germination of the seed.

Under these circumstances, seeds which are inepid from the
bland nature of the starch which they contain become sweet.
By this means many seeds which are inepid from a little
sugar are little suited for the nourishment of man may be made
to contribute his support, by merely steeping them in water
till they sprout, as is practised by the Burmese with the
seed of the cotton-plant. (Malcolm's Travels in Burma.)

A similar transformation of starch into sugar takes place in the ripening of many fruits. Thus the fruit of the banana, or
plantain, which, when gathered green, abounds in starch,
if allowed to ripen on the stalk is destitute of starch, and
yields much gummy and saccharine matters. The same
happens when the palms are about to flower, as all the
starch in their lofty stems is rapidly transformed into sugar;
and hence the sugar palms (Sagat Rumphii, &c.) and the
Mauritia flexuosa (sago-palm of the Orinoco) are cut down
just when the flower-buds begin to appear, to obtain the
sago they contain. In other palms the flower-buds are al-
lowed to protract, and a wound being made in the spatha,
the large quantity of interior fluid is thus collected, and
concentrated by boiling, when sugar is deposited, or the
liquid may be fermented, and so yield the toddy called palm
wine. If these, or the sugar-cane, maize, or our common
pellicule roots, rancap, sukanawa, or bet, is allowed to
flower, all the gummy and saccharine matters disappear
from the roots or stem. The transformation of starch into
gum and sugar is effected by a principle called diastase,
which is so powerful, that one part of it is sufficient to
render soluble the interior of those two thousand parts of
starch, and convert it into sugar.' Wherever buds are
lodged, there the elements of diastase are placed, to come
into play, when they begin to sprout, and supply them with
food in a state of solution, as is the case with the buds or
pieces of potatoes.

Many seeds, before they are ripe, contain a saccharine
substance, which is changed into starch when fully ripe, but
which again becomes sugar in germinating, such as the
garden pea. Many stems of grasses are sweet at an early
stage of their growth, and become no sweeter when become
inclosed. This influences greatly the nutritive powers of these grasses,
according to the stage of growth when they are cut down and
made into hay. (See Appendix to Davy's Agricultural
Chemistry.) Those seeds which are not sweet before they
ripe are often restored to a proper state by the fermentation
(heating) which occurs after the hay is stacked; but this
is sometimes so violent as to consume the rick. It is an
error committed in the agriculture of Scotland that the grass
seeds, while they are still green, when the hay is being
wound, &c are not soaked before they are dried, and that
and hence English horses manifest an aversion to the hay
of Scotland when first offered to them.

These facts explain why it is necessary to pluck up the beet-
root which is grown in the south of France much earlier than
that raised in the north, and also why the gummy and viscid
property of the juice of the sugar-cane varies in different seasons.
The juice of the sugar-cane varies in its constituent parts
according to the nature of the soil, the quantity of rain, the
distribution of heat in the different seasons, and the deposi-
tion more or less of the nutrient of the plants. in which air,
(Humboldt, Pers. Narrative, ii. p. 184.) The soil affects
it much, as the canes grown on the sea-coast, if watered
with salt-water, yield a juice which is brackish: this is
thought however to be due to the air, or to the harder nature
of the juice than that produced from the canes of the interior. (Ibid.,
i. p. 210.) Even the highly manuring of beet-root lessens
the quantity of sugar.

The starch lodged in the stem of certain trees in autumn
is converted, by the ascending sap in spring, into sugar,
with great rapidity. This is the case with the Acer sac-
charinum, or sugar-maple, and many other species of that
genus. This is the same with the ascending sap of the birch,
tree from the root to the shoot, but this does not contain sufficient sugar to permit the concentration of it; there is enough however to undergo the vinous fermentation, and thereby furnish the agreeable
beverage called birch wine.

Next to the starch from the cane and beet-root, among
those which are crystallizable and capable of fermentation,
the most important is the granular sugar obtained from a
great variety of sources. It exists in considerable quantity
in the juice of grapes, and hence the name gumpe sugar,
and is generally obtained from those parts of the grapes
which are extended to the whole class of krummrii sugars. It
forms a constituent of a great many fruits, not merely
fleshy, such as pears, cherries, peaches, melons, dates, figs,
grapes, on which last two it forms a white incrustation when
the fruits are dried, which is known as krummrei sugar.
It exists in the nectaries of many flowers, and is
collected by the bees; hence honey is only one of the kinds
of this sugar. Though harmless in probably all instances to
the bees, from whatever plant collected, it not unfrequently
has a poisonous influence over human beings, when it has been collected from poisonous plants, such as Rhododendrons and their allied genera.*

Granular sugar is readily formed by the action of dilute sulphuric acid on starch, or sugar of milk, or the bastard sugar which remains after the sugar of cane or beet-root sugar. Lignin, or anything containing or formed from it, such as saw-dust, linen-rags, or paper, may be likewise transformed into granular sugar. It is likewise the kind of sugar formed during the germination of grain. Lastly, it is that kind of sugar which is formed by a perverted action of the digestive and assimilating organs in the disease termed diabetes mellitus. [Diabetes.] All these varieties taste less sweet than the cane-sugar, and also differ among themselves; thus grape and beet sugar, which is also formed during the fermentation of the natural starch is sweeter than that obtained from juniper berries. All of them contain less carbon and more water than the cane sugar, and may be regarded as hydrates of sugar.

Sugar, which, though with difficulty crystallized, is referred to this section, exists in many fungi or mushrooms, especially of the genus Agaricus. While it contributes to their nutritive properties, it most likely proves one source of the poisonous properties they sometimes possess, as it is commonly transformed into oxalic acid. Masses of crystals have been observed on the cap of a mushroom, some of which were sugar, while others were oxalic acid. Free oxalic acid is found in the Polyporus sulphureus, Bull., which has been formed at the expense of the sugar.

The only uncrystallizable sugar which is capable of fermentation is the syrup which remains after the refining of the cane and other sugars. It receives the name of molasses, and is used in medicine under the name of Seca, which is preferable to that of thericosa, as this might lead to confusion with a poisonous compound which bears a similar name. Molasses are largely employed for the distillation of rum.

The common sugar susceptible of fermentation are, the sugar of milk and mannite; yet sugar of milk, when by the action of dilute sulphuric acid it is converted into granular sugar, is as susceptible of fermentation as any of the above-described. In other respects it conducts itself like common sugar, except that it produces an acid, besides oxalic acid, it forms aspartic acid. It is procured from whey, either simply by evaporating to dryness (saccharum lactis tepisatum), or by crystallizing it. It is frequently separated from the curd by the addition of a great many substances, which precipitate such as alum, vinegar, tamaradins, and mustard, and in certain diseases these medicated wheys are much recommended.

Sugar of milk has little sweetness, but has a solution of its salts for the taste of other sugars. Sugar of milk is much used by the followers of homoeopathy as the material of their dynamized globules.

Manna sugar constitutes the greater portion of the manna which flows from the Ornus europeus and other sabes in the south of Europe, the bark of the olive-tree, many species of pines, the root and leaves of celery, the bulb of the common onion, and in the rhizome of the Triticum repens, or couch-grass. The sweet juices of many plants, such as beet, carota, &c., when long exposed to the air, generate manna sugar by a partial fermentation. To prevent this is one of the great objects of the manufacturer of beet-root sugar; hence the necessity for speedily concentrating and purifying this juice. To this variety of sugar probably belongs the manna sugar which exists in the root of the plants (Cynodon Dactylon). And also the principle called canellin, obtained from canella alba.

The principle called glycerrhizin, obtained from the liquorice-plants, and the analogous principle from the leaves of the licorice, is an essential constituent of the ploypoly ferm, probably belong here, as also sarscoolin, which exists both in Penna mucronata, P. Sarcoolis, and in the Polypt. Picroel, or the sweet principle which exists in most are formed at the expense of the granular sugar, though unsusceptible of fermentation, and ought to be considered in conjunction with it, from the share it may have in augmenting the sugar in diabetes.

In treating of the dietary properties of sugar, it is necessary to view it in a variety of conditions. In temperate climates sugar is regarded as a luxury, one indeed which is nearly indispensable; but in tropical countries it is a universal article of subsistence, partly as real sugar, and partly, and more generally, as it occurs in the cane, which is either directly produced by the process of boiling, or perverted by previous treatment. It is inconceivable what enormous quantities of the sugar cane are consumed in this way; vast ship-loads arrive daily in the market at Manilla, and in Rio Janeiro; and in the Sandwich Islands every child is seen going about with a portion of sugar put into its mouth.

Sugar is put into the mouth as a confection, or is used as a sweetening for a great number of articles, such as wines, liquors, and other stimulants, which are often accompanied with much nourishment. It is thus used in the treatment of diseases, and as an aliment and witness of life, as well as the most precious article of life. It is the only aliment which is capable of assimilation in a high degree, and is therefore the most durable. It is an article of diet by which man, in some measure, counteracts the loss of some of his natural resources.

Sugar is perhaps the greatest source of the nourishment we derive from the diet; and it is to this that we chiefly resort for the repletion of our natural store. In this view the properties of sugar may be considered as those which are essential in the alimentation of the human body.

The diet of human beings is chiefly composed of sugar; and this, from the nature of the case, must be in a state of constant variation. It is therefore necessary to know the extent to which sugar may be safely employed, and what are the best methods of using it, both for the purposes of health and prosperity.
The net revenue arising from the duty on sugar was:—

<table>
<thead>
<tr>
<th>Year</th>
<th>British</th>
<th>1840</th>
<th>1841</th>
<th>1842</th>
<th>1843</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,790,863</td>
<td>2,872,892</td>
<td>2,977,877</td>
<td>2,952,907</td>
<td>2,938,957</td>
</tr>
</tbody>
</table>

From one of the above sources, the supply, instead of being augmented with the increase of population in this country, has not been able to maintain even a stationary situation. In the old Queen, the imports of sugar from the British West India warden—
If the supply had continued to advance with the increasing population of the United Kingdom, it would now have been considerably more than 4,500,000 cwt., whereas it was only 4,333,000 in 1840; and 4,199,000 cwt., being 2,148,980 cwt. In the former of these years the price of sugar rose higher than it had been at any period since 1817; and in November the average was 57s. 10d. cwt.; and at one time it reached nearly a monopoly price. The British West India sugar in bond. The equalization of the duty on East India sugar in 1836 had given a stimulus to the cultivation of the sugar-cane in the East Indies, and the import of 1840 exceeded all expectation, being 1,066,692 cwt. This was chiefly powder molasses, but the table below will show the great increase which has taken place in the imports from this quarter since 1837. The supply from the Mauritius increased to 703,855 cwt., which was also a larger quantity than had ever been received from that colony. The scarcity of 1840 was so great that 2316 cwt. of foreign sugar were entered for home consumption, paying a duty of 62s., or 39s. the cwt. more than sugar from British possessions. Out of 2316 cwt. thus admitted, 1543 cwt. came from Brazil, 419 cwt. from Cuba, and small quantities from Siam, the Philippines, &c. The quantity of foreign sugar in bond was about equal to the deficiency in British plantation sugar, but the greater part was excluded by the high differential duty. Brazilian molasses, for instance, are admitted of equal quality with British at 54s. and 56s. also in bond; Brazilian white sugars were 24s. to 26s., similar in quality to white sugars from British possessions at 62s. and 65s. The sugar of Brazil, Cuba, and other foreign countries is chiefly exported to the Continent, where the price is on an average from 10s. to 20s. the cwt. lower than in this country. In the foro tariff appended to the Report on the Import Duties, it was proposed to reduce the duty on foreign sugar from 63s. 33d. to 41s. 4d., at the expense of the British bond sugar being reduced from 24s. to 15s. A reduction on British West India sugar would be of no public advantage unless it was accompanied by an alteration of the duties on foreign sugar.

In 1841 the administration of Lord Melbourne proposed to alter the sugar duties, but, being unable to retain office, nothing was done, and in the new tariff (April, 1842) sugar is one of the few articles which remains untouched.

The refining of sugar is not allowed in our colonies, but is an important branch of industry which the mother-country reverts for her own advantage. Although the raw sugar is excluded from consumption by the high duties, it is allowed to be refined in bond for exportation, a drawback being paid, exceeding, it is said, the quantity of raw sugar actually used, and it is the one in which the refined sugars are sold at 20 cwt. of refined. The quantity of sugar refined in bond is about 200,000 cwt. annually. In the year ending 25th June, 1840, the chief export of British refined sugar was to Italy, 49,000 cwt.; British North America, 37,000 cwt.; Turkey, 30,000 cwt.; Russia, 20,000 cwt.; Netherlands, 11,000 cwt.; British West Indies, 10,500 cwt. The sugar-refiner is at liberty to select the raw material from the markets of the world, when the article is intended for export, and so likewise is the exporter of raw sugar. The principal foreign countries from which we imported sugar in 1836 were—Brazil, 197,510 cwt.; Cuba, 165,022 cwt.; Philippine Islands, 144,109 cwt.; Java, 52,106 cwt.; Singapore, 31,654 cwt.; besides small quantities from the British West Indies. The total import of foreign sugar in 1840 was 805,000 cwt., and in 1841, 806,500 cwt., all of which, with the trifling exceptions shown in the table given above, was either exported or consumed.
SUICER, JOHN HENRY, son of the above, was born at Zurich on the 6th of April, 1844, and received a learned education from his father, to whose profession he also devoted himself. He was suddenly called to the pastorship of Zurich and Germany with a pupil, he was recalled to Zurich, and received an appointment to the gymnasium of that town. In 1883 he succeeded his father in his professorship, and in 1745 was elected to the chair of theology in the University of Heidelberg, but fell ill shortly after his handing in that town, and died there on the 23rd of September, 1765.

Besides the Notes to his father's 'Thesaurus,' he wrote, 1. 'Compendium Physicis Aristotelico-Cartesianis,' Amst., 1863; Bâle, 1891; 12mo.; 2. 'A Commentary on the Epistle of Paul to the Colossians,' Zürich, 1869, 4to., to which are added, in the same volume, three discourses, 'De Fortunis Graeciae Antiquae,' 'De Graecia Christiana,' and 'De interna Ecclesiae reformatae Terroribus,' 3. 'Specimen Com- mencium 'Histoire de l'aliotulam ad Ephesos,' in the 'Miscellanea Helvetiorum.'

J. H. Suicer is sometimes confounded with an ancestor of the same name, who wrote 'Chronologia Helvetica, regestas Helvetiorum ad nostrum usque tempora complectens,' Helvetiae, 1721, 8vo; 'Histoire de l'Eglise de Zurich,' 1732, 8vo. He was the founder of the 'Archives Helvetica' of Zurich. He places the foundation of Zurich in a.m. 1580, but he is a trustworthy historian of modern times. He also wrote a history of Switzerland down to the year 1532, which was published in MS, in various libraries. (Life of J. H. Suicer, by J. R. Wolff, Zürich, 1745, 4to. Historiographie Universelle.)

SUICIDE is the term usually applied both to the act of self-destruction and to him who commits it. Of the many points of view, in which it may be considered, those that are the most definite and the most important in which it is regarded as a subject of medical investigation. It will therefore be adopted in the present article.

In this view the most important distinctions among cases of suicide: 1. Where he is persuaded or voluntary, and it is within his power, 2. Where he is not persuaded or voluntary, and it is not within his power. Of these two classes: in one, a man is led to disregard his life for the sake of something for which his death is necessary; in the other, he is de- pressed by an evil more intolerable than the act of dying. But whatever his motive, it may act in two different ways, and the suicide may be, as M. Esquirol has said, either acute and involuntary, or chronic and prepossession. Of, again, suicides of all kinds may be divided (and this is probably the most practical method) according to the condition of the mind and body. Of the act of suicide, he who commits it in each case constitutes the disposition to self-destruction.

In many cases this disposition is only a part of the general perversion of the judgment in complete insanity: it thus exists in the most severe cases of the signs of a diseased mind. Some are merely melancholy; some are carried on by illusions which lead them, as if unintentionally, to suicide; some have sensations which they imagine may be cured by such violence as proves fatal; some are driven to the act by commands which they imagine they have received; some destroy themselves at the commencement of insanity, when they are conscious of the malady which threatens them; others, in their convalescence, in horror at the excesses which they have committed, or at the mere thought of them. (Life of J. H. Suicer, by J. R. Wolff, Zürich, 1745, 4to. Historiographie Universelle.)

There are also cases of monomania in which almost the only indication of insanity is the desire for self-destruction, excited by an illusion respecting some melancholy event, or by some fancied command. There is a peculiar variety of ter- rors in the forms of monomania, in which the desire for destruction leads the patient to take the lives of others, against whom he bears no ill-will, before he attempts his own. Many instances of this homicidal monomania, as it is called, have been recorded. Among the most distressing of the worst examples of it has occurred in London, a man murdering three of his children and himself, in circumstances which could leave no doubt of his insanity.

There are conclusions of the mind which are not called indications of insanity, but which may lead to suicide: for instance, suicide by thought or by actions which do not less strongly predispose to suicide. Such is especially such that named ennui, or tedium viti, for which, though it is thought by foreigners to be so common in Eng. and, that Sauvages has called it 'melancholin Anglica,' we have in our language no term except the very inexpressive one, spleen. Many circumstances give rise to this state of mind. It occurs sometimes in young persons who are sad, with a passive anxiety for some object, they hardly know what to complain that they are useless in the world, or not cared for, and slowly pine away or destroy themselves. But more commonly it is the consequence of a want of occupation, or the disheartening state of life from which they are, in the excesses or in pleasure, to one of voluntary or compulsory repose; or it results from the difficulty which those who have long lived in the excitement of frivolous pursuits find in maintaining it by new objects of desire.

In all these cases the suicide is of the chronic or prepossession kind; and in all, the condition of mind which precedes it is connected with a perversion of the judgment so obvious, that no reasonable person could hesitate to regard it as insufficient for the purpose of the law. It is in the preparation for the act, very few persons would deny that, under similar external circumstances, it would not have been committed by a sane man; and this is true of the great majority of prepossession suicides in the present day.

In the acute mania, the disposition to commit suicide with no skill or reason, and to destroy himself, the attempt is generally, though want of determination, abortive, and he again sinks into the same dependance, nothing.

Lastly, there are examples in which suicide is committed with perfect coolness, being adopted, after due deliberation, and as an attempt to save the world, and to put an end to the miseries of the present world. This is the case of the Levite of the time, and as far as the knowledge of the individual enabled him to judge, could be followed. Such are many of the cases in which men, finding themselves afflicted with incurable and painful diseases, have shortened that which they believed would be a miserable life; and of the same class are the suicides committed in accordance with national custom, or superstition, or from patriotic motives. The cases of this class are not proper subjects for medical consideration, for in these the man does not disregard the law, as described above, in obedience to custom or authority; or, when deliberation is used, the conclusion is only the necessary result of the error in the premises.

Such are the states of mind which most commonly predispose to suicide and that circumstance which precipitates them. The character of the act itself usually corresponds closely with that of the mind by which it is urged. By those who commit it after deliberation, the means employed are almost always successful: so they are when men who have been prepared to commit suicide have been urged to do so by visible and evident impulse of the fear of disgrace, the endeavour is often abortive; the means chosen are insufficient, or they are awkwardly employed; and it deserves notice, that the attempt generally seems to be made as a last resource, though usually never rarely repeated, and often who has made it, in the next minute seeks assistance and bitterly repents his folly.
There are other circumstances of which the influence in producing the disposition to suicide is less obvious, and is detected only by a statistical comparison of the number and characters of those who have committed suicide with those who have attempted suicide. Such are the varieties of climate, of habits of life, of age, &c., on all of which reports, more or less accurate, have furnished useful information.

The names of the following countries are placed in the order of the degree of temperature in the summer, according to the population:—the United States, England, Prussia, France, Austria, Russia, Italy, Spain.

It is a generally-received opinion that cold foggy climates favour the development of the suicidal disposition; but in England this opinion is not supported by facts as similar to this as the Great Britain, the proportion of suicides is lower than in any of the countries just enumerated; and that many circumstances are capable of counterbalancing whatever influence climate may have, is proved by the number of suicides in the same country having varied considerably in different periods.

In accordance with the same general opinion, it is commonly said that suicides are more frequent in the latter part of the autumn than in the summer; but the kind of weather which is most favourable to the suicidal disposition is that of long-continued heat and drought. Of 1131 suicides committed at Berlin, Hamburg, Westminster, and Paris, there were, in the first quarter of the year, 237; during the second, 228; during the third, 332; and, during the fourth, 260. A similar influence of the spring and summer weather, in favouring the disposition to suicide, is proved by the statistics of M. Esquirol at the Salpetrière, and by those of M. Prevost, who found those suicides committed in ten years, in the months of June, July, and August, to be 312; in March, April, and May, 191; and, in the months of September, October, and November, 186. The monthly number of suicides in the respective months varied as follows:—April 15, June 18, August 17, July 15, October 14, May 13, March 10, November 9, September 6, January 5, February 5, December 3.

From the returns of the Westminster Registrar (Journal of the Statistical Society, vol. iv.) it appears that in the first quarter of twenty-five years there were 169 suicides, in the second quarter, 192, in the third quarter, 139, and in the fourth quarter, 146. The greatest numbers occurred in June, July, and March. From all these facts there can be no doubt that spring and summer have a worse influence on the suicidal disposition than either autumn or winter.

The tendency to suicide varies greatly among persons of different stations and occupations. In a recent letter from Mr. Farr to the registrar-general, this tendency is shown to be least among persons who carry on occupations out of doors, and greatest among artisans who are weakly from birth, are confined in-doors, have their rest disturbed, or have little muscular exercise. The proportion of annual suicides among tailors, shoemakers, and bakers, for example, is 1:33 to 10,000; and among tailors, shoemakers, and bakers, 7:43 to 10,000; and, in general, the tendency to suicide is twice as great among artisans as it is among launders. The phenomenon is not observed at Geneva, as has, till now, been asserted, a tendency to increase the number of suicides: its influence in this respect is not at all discernible. Neither does the state of poverty or wealth seem to have any material influence; but all returns agree in proving that, among the inhabitants of large cities and their neighbourhoods, suicides are much more frequent than among those who live in the rural districts. M. Guerry has shown (Statistique Morale de la France) that the frequency of suicides in France regularly decreases as the distance from Paris increases, and that the rule holds true of all the departments except that in which Marseille is situated, for this town has the same influence in exciting the disposition to suicide which Paris has. Similar results were obtained by Prevost from statistics collected at Geneva, and they are completely confirmed by general observation in England; though, from commerce and pleasure being less centred in our metropolis than they are in those of most continental kingdoms, the difference is not so easily discernible.

The tendency is much greater among frequent amorous men than among women. By the Westminster Returns, already quoted, it is shown that in twenty-five years 479 males and 178 females destroyed themselves: the proportion therefor is 2:72 to 1. Nearly the same proportion was observed by M. Prevost in the respective letters of Geneva and M. Esquirol, comparing the respective results of all tables, says the proportion may be stated generally as three males to one female.

There is sufficient reason to believe, that in the civilized state the disposition to suicide is less than in savage life. Some difference in this respect however is noticed by M. Prevost in the United States, for he found, that although the number of suicides among married men was less than that among single men, the proportion among married and single women was just the reverse.

The following table will show at once the variations in the disposition to suicide, according to the difference in the number of suicides in each of four different places, as compared by persons of several ages, and the last column shows the proportion of persons of each of these ages in every thousand of the whole population, exclusive of children under ten years old.

<table>
<thead>
<tr>
<th>Age</th>
<th>Berlin</th>
<th>Paris</th>
<th>Bay</th>
<th>Genoa</th>
<th>Propor-</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 20</td>
<td>224</td>
<td>61</td>
<td>91</td>
<td>31</td>
<td>324</td>
</tr>
<tr>
<td>20 to 30</td>
<td>251</td>
<td>253</td>
<td>21</td>
<td>292</td>
<td>218</td>
</tr>
<tr>
<td>30 to 40</td>
<td>96</td>
<td>182</td>
<td>94</td>
<td>272</td>
<td>166</td>
</tr>
<tr>
<td>40 to 50</td>
<td>156</td>
<td>159</td>
<td>188</td>
<td>237</td>
<td>176</td>
</tr>
<tr>
<td>50 to 60</td>
<td>146</td>
<td>161</td>
<td>255</td>
<td>66</td>
<td>100</td>
</tr>
<tr>
<td>60 to 70</td>
<td>77</td>
<td>126</td>
<td>285</td>
<td>46</td>
<td>88</td>
</tr>
<tr>
<td>70 to 80</td>
<td>41</td>
<td>35</td>
<td>106</td>
<td>16</td>
<td>217</td>
</tr>
<tr>
<td>80 and upwards</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

It thus appears that the disposition is greatest between the ages of 20 and 30, both absolutely and relatively to the whole number of persons living at each age. Under the head of Paris in the preceding table the suicides are arranged according to the means by which they were perpetrated. Many returns have been made to determine the proportion in which each method of self-destruction is employed in different circumstances. But the table, of little value, it seems, to be determined by the opportunities most conveniently afforded in different situations, and by the fashion (if one may so speak) which exists at particular times for one method or another. In the neighborhood of lakes or rivers, for example, always the most frequent method of self-destruction is the places more remote from large quantities of water, hangings, or shootings.

From the various degrees of force with which the preceding circumstances operate, and from the influence of others which are not separately capable of being appreciated, it results that the proportion of suicides in different countries, and in the same country at different times, varies widely. The following calculations are pretty accurately the degrees of difference:—in Westminster the proportion of suicides annually, between 1832 and 1856, was 1 to every 6379 of the population; in London the proportion is in general as 1:33 to 10,000, in those who follow hard their trade, such as tailors, shoemakers, &c.; as 7:43 to 10,000, among the sedentary occupations; and as 4 to 10,000 among gentlemen. The number of persons who are known to commit suicide in England amounts to about 1000 annually; and besides these there are many who, being found drowned, without evidence whether their deaths were accidental or intentional, are not returned among the cases of suicide. According to M. Quetelet, the proportion of suicides annually is, in—

<table>
<thead>
<tr>
<th>Country</th>
<th>Per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>1 to 49,182 inhabitants</td>
</tr>
<tr>
<td>Austria</td>
<td>1 to 20,900</td>
</tr>
<tr>
<td>France</td>
<td>1 to 18,000</td>
</tr>
<tr>
<td>State of Pennsylvania</td>
<td>1 to 15,875</td>
</tr>
<tr>
<td>Russia</td>
<td>1 to 14,404</td>
</tr>
<tr>
<td>City of Baltimore</td>
<td>1 to 12,665</td>
</tr>
<tr>
<td>Boston</td>
<td>1 to 12,500</td>
</tr>
<tr>
<td>New York</td>
<td>1 to 7,757</td>
</tr>
</tbody>
</table>

In and around Paris the suicides between—

<table>
<thead>
<tr>
<th>Year</th>
<th>Suicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1817</td>
<td>1 to 2,241</td>
</tr>
<tr>
<td>1821</td>
<td>1 to 2,651</td>
</tr>
<tr>
<td>1826</td>
<td>1 to 3,415</td>
</tr>
<tr>
<td>1830</td>
<td>1 to 3,825</td>
</tr>
</tbody>
</table>

In Paris the average annual number of suicides was—

<table>
<thead>
<tr>
<th>Year</th>
<th>Suicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1817</td>
<td>1 to 2,241</td>
</tr>
<tr>
<td>1821</td>
<td>1 to 2,651</td>
</tr>
<tr>
<td>1826</td>
<td>1 to 3,415</td>
</tr>
<tr>
<td>1830</td>
<td>1 to 3,825</td>
</tr>
</tbody>
</table>

In 1833 there were 574 suicides. In Paris therefore there appears to have been a regular increase in the number of suicides from 1822 to 1854; but
in England there is no reason to believe that a similar augmentation has taken place. From the Westminster return already quoted, it appears indeed that the annual average number of suicides there has increased, but their increase has not been in a proportion corresponding to that of the population. Thus, dividing the time into periods of five years, as the number of suicides was—

From 1812 to 1816 . . . 228
1817 to 1821 . . . 290
1822 to 1826 . . . 258
1827 to 1831 . . . 310
1832 to 1836 . . . 316

But comparing these numbers with those at the census immediately preceding each of three quinquennial periods, it appears that the proportion of the number of suicides to that of the population is—

After 1811 . . . 1 in 6332
1821 . . . 1 in 7623
1831 . . . 1 in 6379

From what has now been said of the variety of causes which may engender or encourage the disposition to suicide, it must be manifest that no general account can be given of the morbid conditions of the body, or of the brain, which accompany the mental disturbance. Many facts relating to this subject are in the books, and the instances which are unconnected by any generalization. We may therefore proceed at once from the causes to the treatment of the suicidal disposition.

Here also what has been said of the one may serve for a guide to the treatment of the other. With respect to the treatment of those among the insane who exhibit a tendency to self-destruction, there can be no other deviation from the ordinary treatment of insanity than that which consists in the careful removal from them of all means by which their intentions may be carried into effect. Both for those and for those who show no other sign of insanity than their desire for death, the most successful remedy is the giving full occupation for the time: this is indeed essential to the safety of the person himself. But taking into view the possible motives of suicide, more ease of the patient moreover should be one which will carry the mind as far as possible from the subjects on which it is morbidly sensitive, or on which it has been accustomed to dwell too intently. Above all, a person suspected of an intention to commit suicide should be kept carefully from the contemplation of histories of self-destruction. Numerous instances have proved that the tendency to imitate the acts of others operates as forcibly in producing suicides as in encouraging the most trivial fashion. Only last winter (1841) there was in this town the story of the girl who, according to testimony ex-hibiting no other signs of insanity and urged by no strong motive of despair, felt irresistibly impelled to attempt to drown herself, especially by jumping off the bridges into the Thames. Scarcely a night passed without one or more such attempts. Occasionally, indeed, in many similar instances of epidemic suicidal mania proved successful. All who were brought before the magistrates charged with attempts to drown themselves were punished by a period of their existence, shorn a pity be inflicted. It became known that this plan was being followed, the epidemic ceased. In other instances it has been found that the horror of being disgraced after death has been sufficient to deter men from imitating others in the commission of suicide. For all cases of suicidal tendency therefore there is a plain preventive means which should never be neglected; and the fact which the histories of these epidemics furnish, namely, that the fear of being disgraced after death operates forcibly in deterring men from suicide, is a sufficient proof of the true nature of the feeling which subdues and affords by itself sufficient evidence of the insanity and irresponsibility of those who commit it. If it be desirable to diminish the number of suicides, the practical rule should be to place suicides under the same laws that place criminals under, and not to remit the appropriate punishment for either except on the clearest proof of such insanity as renders a man by common consent irresponsible.

SUICIDE is death caused by the act, voluntary or involuntary, of the person living. A rescript of Hadrian expressly directed that those soldiers who, either from impatience of pain, from disgust of life, from disease, from madness, from dread of infamy or disgrace, had wounded themselves or otherwise attempted to put an end to their existence, should be punished with ignominy (Dig., 49, tit. 16, s. 6, 'De Re Military'); P.C., No. 1453.

...but the attempt of a soldier at self-destruction on other grounds was a capital offence; and those who, believing in their own innocence, attempted to make their situation known to the authorities, and were punished for this purpose, their sentence was not only out of all proportion to their guilt, but in the subsequent prosecution for heinous offences, or being taken in the commission of a great crime, put an end to their existence from fear of punishment, forfeited all their property to the Fiscus. (Dig., 48, tit. 21, s. 3.) Suicide was not uncommon among the Romans in the latter periods of the Republic. It was regarded with the utmost contempt by the emperors, and was a very common order of instruction from which the emperors, as we see from the examples of Tacitus, and in the younger Pliny, who mentions the case of Corellius Rufus (Ep., I. 12), Silius Italicus (tit. 17), Arnaecius (Cic., 5. 21), and the case of the wife who was overruled in persuading her husband, who was labouring under an incurable disease, to throw himself, tied to her, into a lake. (Silius Italicus.) Except in the cases mentioned in the two titles of the 'Digest' above cited, suicide was not forbidden by the Roman law; nor was it disowned as a means of escape.

Voluntary suicide, by the law of England, is a crime; and every suicide is presumed to be voluntary until the contrary is made apparent. This crime is called self-murder and felony of se (self-felony), neither of which terms is calculated to convey a correct notion of the legal character of this offence, or of the mode in which it is punished. A felo de se (self-felon) is a person who, being of years of discretion and of mature reason, intentionally kills himself, intending to do so, or intending to do some other act which would engender a character both unlawful and malicious; as if, in attempting to kill another, under circumstances which would have rendered such killing either murder or manslaughter, a gun was taken in the hand, and a ball was fired into the casualy in the hand of the person whom he intended to kill. Death occasioned by falling upon a knife held up in his defence by the party assaulted, would not be suicide by the assailant, but justifiable homicide by the party assaulted. (Dig., 47, tit. 14, ch. 11.) In no cases can it be said that a person has been committed if death do not ensue within a year and a day of the blow or injury; or, in other words, if a whole year intervene between the day on which the blow, &c., is given, and the day on which the death ensues.

The legal effect of a self-felony is a forfeiture to the crown of all the personal property which the party bad at the time he committed the act by which the death was caused, including debts due to him, but though the crime is called felony, it was never attended with forfeiture of freehold, and never worked any corruption of blood. It appears however that formerly the crown was entitled to the year, day, and waste of the freehold lands of a self-felon; as we find that in 1289 the widow of Aubrey or Albert (Alberici) de Wykeham, by her justiciary, undertook to return to the king, the lands, tenements, &c. of Aubrey and his heir. (2 Maxd., Esch., 347.) The fact that a self-felon has committed is ascertained by an indictment or inquisition taken before the mayor or other officer having authority to hold inquests, upon view of the dead body, and examination of witnesses in the presence of a jury, summoned, as in other cases, to inquire into the cause of a sudden or violent death. (Cooper.)

Where a self-felony is found by the inquisition, the jury ought also to inquire and find whether the party had any, and, if any, what goods and chattels at the time when the felony was committed. But an omission in this respect may be supplied by an inquisition taken by the sheriff under a writ De melius inquirendo, or 'further inquiry.' The property in the self-felon's goods, upon being found in either of these modes, is vested in the crown with relation to the other goods, at the discretion of the crown, as in the case of goods and chattels of his husband, 'a felon by drowning himself,' saving to the king the year, day, and waste of Aubrey's lands and tenements. (2 Maxd., Esch., 347.) The fact that a self-felon has committed is ascertained by an indictment or inquisition taken before the mayor or other officer having authority to hold inquests, upon view of the dead body, and examination of witnesses in the presence of a jury, summoned, as in other cases, to inquire into the cause of a sudden or violent death. (Cooper.)

...
becomes subject to the ordinary liabilities of a personal representative.

It was formerly usual for the crown to make grants to its servants and other persons, as a reward for their services. These grants were particularly of forgeries, or of forgeries accruing within a particular district. Grants of the latter description were usually made in fee simple, and many such grants are still in force in various parts of the country. An Act 5 W. and M. c. 22 to relieve such parties from the necessity of litigating their rights with the crown whenever a forgery occurred, by directing that, after the inrolling of such grants in the court of King's Bench, no process should be brought on the part of the crown to question the right of the grantee.

The finding of the jury is not conclusive either as to the fact of self-belong or as to the property of the deceased; and all persons interested in overruling any part of the finding may do so upon the inquisition, and contest its sufficiency by a demurrer, or deny its truth by a traverse. The issues of law or of fact, raised upon such pleadings, are disposed of in the usual cases. (Pleading.)

Formerly coroners returned their inquests into the court of King's Bench, in order that process might issue against those who made seizures, set up claims, or withheld property or debts in derogation of the rights of the crown. (Ree v. Sutton, 1 Saunders, 270.) Since the passing of 4 Geo. IV. c. 9, that practice is no longer necessary, and the course now is, that any party who considers himself aggrieved by the finding of the coroner's jury obtains a writ of Certiorari from the court of King's Bench, by which the court is required to return the inquisition, after it has been made, if the court, upon inspection of the inquisition, see clearly that it cannot be supported, in consequence of some legal defect, they will quash it without putting the party to the expense of a demurrer. If however the inquisition be good in substance, the coroner may be ordered to amend defects in form.

Involuntary suicide is where death is occasioned by the act of the party, either without an actual intention of destroying life or of committing an unlawful act; and such a state of mind as is a legal cause of the party intending to do what he does. The first class of cases may be established by showing that the act was done with some other intention. The practical difficulty generally arises upon the second class. Neither self-belong nor any other crime can be committed by a child who has not attained years of discretion; nor can it be committed by a person who, by disease or otherwise, has lost, or has been prevented from acquiring, the faculty of discerning right from wrong. A tendency to self-destruction is commonly the result of insanity; as well as of the proximity or connection with the morbid affection and the act of violence which occasions death may often be very distinctly traced. It is not unfrequently happens however that cases arise in which it is nearly impossible to determine whether the act is to be ascribed to insanity or to the natural faculties, or to passions which are not under the ordinary restraint.

At common law, which in this respect follows the canon law, a person found by inquest to be felo de se is considered as having died in mortal sin; and his remains were formerly interred in the public highway without the rites of Christian burial, and a stake was driven through the body; but by the 4 Geo. IV. c. 52, the coroner or other officer by whom the inquest is held is required to give directions for the private interment of the remains of any person against whom a finding of felo de se shall be had, without any stake being driven through the body, in the churchyard or other burial-ground of the parish in which the remains of such person might by the laws or customs of England be interred, if the body of the deceased was not known to have been made to be within twenty-four hours from the finding of the inquisition, and to take place within the hours of nine and twelve at night, without performance of any of the rites of Christian burial.

The Code Pénal of France contains no legislation on the subject of suicide. Of the modern codes of Germany, some adopt the silence of the French code, and others vary in their particular provisions. In the Bavarian and Saxon code, however, the law was for the time unaltered. The Russian code forbids all mutilation of the dead body of a self-murderer under ordinary circumstances; but declares that it shall be buried without any marks of respect otherwise suitable to the rank of the deceased; and it directs that if any sentence has been pronounced, it shall, as far as it is feasible, be executed, regardless having to decency and propriety, on the dead body. Besides which, the body of a criminal who commits suicide is commonly mutilated by the authorities against him is to be buried at night by the common executioner, at the usual place of execution for criminals. The Austrian code simply provides that the body of a self-murderer shall be buried by the officers of justice, but not in a churchyard or elsewhere.

SUIDE, Swim; Sue, Lin.; a family of PACHYDRAXATA of high importance to man for economical purposes.

The swine have on each foot two large principal toes shod with stout, hard hoofs, and two inner toes, rather shorter and hardly touch the earth. The incisor teeth are variable in number, but the lower incisors are all levelled forwards. The canines are projected from the mouth and recurved upwards. The muzzle is terminated by a truncate snout fitted for turning up the ground, and the stomach is but little divided.

Organisation.

Skeletwo.—Cuvier remarks that the skull of a hog is nearly a quadrangular pyramid, the palatine surface of which is almost perpendicular to the base, represented by the occiput. The nasal bones occupy the upper part of the muzzle; their base is slightly widened; the other extremity advances a little pointedly above the nasal aperture. The intermaxillaries ascend rather obliquely outward, and are prolonged nearly to the base of the nose. The nasals are terminated by a prolongation of the peculiar bone which supports the snout. The orbit is round, and well defined (serré) by an advance of the frontal and the two post-orbital apophyses, the process forming the roof of the orbit which becomes convex. The two it is nearly the sixth of a circle, not closed. The frons descends in front of the orbit more than a fourth of the length of the muzzle before they encounter the nasal bones. The lacrymal bones occupy a rather large parietal space on the lower surface of the cheek, and are pierced, the upper one on the border itself, the other a little in front of the border of the orbit. In the orbit, the lacrymal descends to the upper border of the vault of the sub-orbital canal. The jugal bone is articulated to the zygomatic process; the latter is large, and is received into the temporal bone behind the post-orbital apophysis descends at first, and afterwards becomes horizontal. The jugum apophysis of the temporal bone ascends a little, and rises to a point backwards to give the jugal process. The temple is well marked by a parietal crest, which goes to the occiput without touching its congener; so that the occiput is truncated square above, where it widens a little. The palate is prolonged a little behind the origin of the external pterygoid apophysis; at the posterior portion of the palate is a long narrow septum which ascends thus just before the last molar tooth. It is prolonged a little on each side, where it terminates in form of a tube or between the two pterygoid wings. It ascends into the orbit, showing nothing there but a process (languette) by which it is articulated to the parietal bone; it forms the upper border of the sub-orbital canal. The internal pterygoid apophyses are distinct from the body of the bone, high and narrow, and terminated in a hook. The external apophyses at least equal them, make one with the body of the bone, and also terminate in a hook. In the temple the posterior sphenoidal is nearly reduced to the anterior surface of the external pterygoid apophyses. It articulates itself with the temporal bone, does not touch the frontal except with its point, and does not reach the other parietal. The anterior part occupies most space there, and it permits nevertheless the frontal bone to descend in front of it till it reaches the palate, and even to bend itself back to enter into the vault of the sub-orbital canal between the maxillary and the palatine bone. This part is divided into the anterior canal, the posterior canal, and the medial canal. The superior surface of the body of the bone presents the pterygoid plates, the infraorbital canal, and the infra-orbital foramen. The latter communicates with the ethmoid sinus through a tube which leads to the external nose. The inferior surface of the body of the bone is elevated, and presents the two pterygoid plates, the infraorbital canal, the sphenoidal foramen, and the two pterygoid plate foramina. The pterygoid plates, the superior canal, and the infra-orbital foramen are the principal parts of the sphenoidal bone. The anterior canal of the sphenoidal bone is closed by a thin plate; the posterior canal has the form of a long tube, the external opening of which is in the sphenoidal canal. The anterior canal of the sphenoidal bone is closed by a thin plate; the posterior canal has the form of a long tube, the external opening of which is in the sphenoidal canal. The anterior canal of the sphenoidal bone is closed by a thin plate; the posterior canal has the form of a long tube, the external opening of which is in the sphenoidal canal.
belong to the temporal bone, from which it is not separated even in the fossa, but the petrous bone (rocher) is long distinguishable: this last does not appear externally. The two frontal bones unite together early, and the two parietales still earlier: there is no interparietal in those subjects which have seen the light. The suborbital hole is rather large, above the fourth molar, nearly in the middle of the maxillary bone. Its canal opens widely in the orbit, at the ordinary place. The ischyrmal holes have been already noticed. There is below the orbital surface of the orbital bone a deep hole without any use of which was unknown to Cuvier. At the upper vault of the orbit is a suborbital hole, which conducts to an aperture pierced on the front. The orbital hole is near the suture with the anterior sphenoid. The analogous holes to the sphenoid and pterygopalatine bones are in the suborbital canal. The last exit of the palate opposite the penultimate molar. The optic and sphenoid orbital holes, are approximated as ordinarily, and rather large. The oval aperture is separated by the whole external pterygoid apophysis, the direction of which is transversal. It is common to the sphenoid and temporal bones, and is only separated by a small bony ridge from a large cartilaginous hole, which answers in part to the internal side of the tympanic cavity. Under the junction of the anterior sphenoid to the posterior is a double canal, which goes into the thickness of the vomer. The posterior foramen lacerum, the stylo-mastoidian, and the condyloidian are very much approximated near the mastoid apophysis. At the interior one may see that the frontal and sphenoidal sinuses are very much extended, and narrow the cerebral cavity a good deal. The first-named sinuses extend to the occiput. The sella ascends nearly vertically to sustain the optic nerves. The bony tentorium only exists on the sides, it does no more than pass upon the petrous bone. The ethmoidal fossa is very much sunk, of moderate size, divided by a very salient crest, and ridged with numerous holes. The area of the cerebral cavity is only half that of the cranium, as it appears externally, so much is it augmented by the great sinuses which exist even to the occiput.

Different Suidae offer more or less variations in the length of the head.

The Wild Boar (Sus Scrofa, Linn.) has the face longer and the skull less elevated; the domestic pig of Europe has the cranium slightly more elevated, and the face still sufficiently long; the Siamese pig has the face shorter, the cranium more convex in the frontal region, and larger in proportion.

The Masked Boar of Africa differs from the European boar in having its zygomatic extending more outwards and taking a more horizontal direction, and especially by a great elevated apophysis, above the alveolus of the canine tooth, and ascending obliquely so as to leave a canal between it and the maxillary bone. It terminates in a great tubercle, and the nasal bone opposite to a similar tubercle. It is to these two prominences that the great warts or mamillae, which give this animal so hideous an aspect, adhere.

The Babirousas, when compared with a Siamese hog of the same size, has the cranium longer in proportion to the muzzle, the orbit more advanced, the temporal fossa more approximated on the cranium, the zygomatic arch longer and ascending less suddenly backwards, and the tympanic cavities much longer.

The peculiar character of the Ethiopian boar (Phacochoerus) consists in the retreat of the eyes and the relative smallness of the temporal fossa, the necessary consequence of that retreat; in the enormous development of the base of the zygomatic arch; and in the width of that part, as well as in the interval between the orbits. The alveoli of the enormous canines form a projection on each side of the muzzle, which is terminated by two small peculiar bones that unite the extremities of the nasal to those of the infra-orbital bones, and which correspond to the single bone carried on the extremity of the intermaxillaries in the common hog. The tympanic cavities are small, terminated in a point. The basilar part has between them a book projecting on each side, and in front are two very deep and very remarkable fossae prolonging the vault of the back nostrils, and hollowed, principally, in the sphenoid bone.

The Peccary approximates more to the Babirousas than to the Siamese hog, its muzzle is still shorter; the tympanic cavities are rounded and cellular; its mastoid apophyses are very short and directed backwards; its palate is prolonged,
The dentition of the hog has its characters and laws, like that of all other animals. The normal number of its teeth is six incisors, two canines, and fourteen molar teeth in each jaw. (Osaementa Fossiles.)

In the Proceedings of the Zoological Society of London for 1837, is an interesting notice, by T. C. Eyton, Esq., of some osteological peculiarities in different skeletons of the genus Sus. The animals observed were, a male pig of the Chinese breed, brought over by sacred masturbation from a female pig from Africa, procured from Sir Rowland Hill, bart., M.P.; and an English male of the long-legged sort. Upon examining the first, Mr. Eyton was surprised to find that a great difference existed in the number of the vertebrae from that given in the Lepons d'Anat. (Comp. vol. ed. 1835, p. 192), under the head either of Saugier or Cucres Domestique. He also found that the other varieties differed, and he gives the following table of those differences:

<table>
<thead>
<tr>
<th>Species</th>
<th>Male</th>
<th>Male</th>
<th>Male</th>
<th>Males</th>
<th>Samplers</th>
<th>C. hog</th>
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<td>English</td>
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<tr>
<td>African</td>
<td>27</td>
<td>13</td>
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<tr>
<td>Chinese</td>
<td>5</td>
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<tr>
<td>C. S.</td>
<td>21</td>
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<td>19</td>
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<tr>
<td>Total</td>
<td>53</td>
<td>44</td>
<td>49</td>
<td>50</td>
<td>53</td>
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But he adds that it is possible that some of the caudal vertebrae may be missing.

Mr. Eyton further remarks, that the Chinese Pig was imported into this country for the purpose of improving our native sorts, with which it breeds freely, and the offspring are again fruitful. He adds, that he had seen a fine litter of pigs from Sir Rowland Hill's African Boar, corresponding with the female he described, the mother of which was a common pig; and he remarks, that time will show whether they will again be fruitful.

From what has been stated, says Mr. Eyton, in conclusion, 'the tusk appears to me to be, that either the three Pigs must be considered as distinct species, and which, should the offspring of the two latter again produce young, would do away with the theory of Huter, that the young of two distinct species are not fruitful, or we cannot consider osteological character a criterion of species.'

'I have been induced to offer the above, not with any desire of species-making, but of adding something towards the number of recorded facts by which the question, what is a species? must be answered.'

Undoubtedly all such records are valuable; and the zoological labours of Mr. Eyton (especially in the department of ontology) are too well known to require our humble praise. But there seem to us a little more point in giving a definition of Home, and a longer time for the demand - bone. Nevertheless no bone has a perfect resemblance, and on comparison the difference will be detected, although it cannot be expressed in words.

The differences of the elements are also very difficult to be expressed towards the upper part than that of any ruminant. The great trochanter is wider and a little notched; the projecting ridge which goes from one to the other trochanter is more rounded; the internal edge of the rotular pulley ascends less than the other, which is the contrary of the structure in the ruminants; the notch between the condyles is narrower and pointed forward, &o. The tibia is easily recognised, because it is shorter, has its lower head squared, and is not narrowed from behind forwards, and has no articulation with the fibula. The principal difference of the tarsus rests on the small wedge-shaped bone, on the vestige of the fifth toe, and in the scapuloid remaining distinct from the cuboid bone. The astragalus tends to that of the ruminants by the form of the pulley of its lower head. The metatarsal bones, metatarsals, and toes cannot be confounded with those of any other animal, and their characters, partially visible externally, are known to all naturalists, or will be easily divined by them. It need only be remarked, that in the Pecary the two middle bones of the metatarsus and metatarsus are soldered into a cannon, as in the ruminants, and that the only vestige in this animal of the external toe on the hind foot is a small flattened style, applied against the base of the cannon bone.

The cervical vertebrae of the hog are not easily confounded with those of any ruminant of its proportions, by reason of the brevity of their bodies, and the width of their transverse apophyses, especially of those of the penultimate one. The body of the vertebra is not so convex in front as in the ruminants. (Osaementa Fossiles.)
nomination of the Suide requiring particular notice; except perhaps the Stomach. Nos. 548 to 551 (both inclusive) of the Physiological Series of the Museum of the Royal College of Surgeons in London are preparations of the stomachs of Hogs; and Nos. 551 A to 553 (also both inclusive) are preparations of the stomachs of Pecaries. We would particularly call attention to No. 551 A, which exhibits the first number to the house of the singular viscera divided into three compartments by the production of the two ridges, which are situated one to the left and the other to the right of the cardiac orifices, analogous to those in the stomach of the Hog. The cardiac, or left division, is greatly extended in the transverse direction, and terminates in two moderately elongated cule-de-sac. This division communicates with the middle compartment by a broad circular aperture. The esophagus opens into the middle compartment, which is of less extent than the preceding, and communicates by a smaller transverse aperture with the pyloric division. The whole of the middle compartment is lined with cuticle, continued from the esophagus. The left and right divisions, being laid open, show the extent to which the cuticle is pressed into them. The greater part of the cardiac cavity, with the two cule-de-sac, being lined by a villous membrane, proves that it has a greater share in the digestive processes than as a mere preparatory receptacle. The villous coat of the pyloric cavity and the cuticle lining the pylorus is considerably increased near the pylorus, the valvular structure of which is better seen in No. 551. (Owen in Cal. Mus. Coll. Reg. Chir., vol. i.)

**SYSTEMATIC ARRANGEMENT AND NATURAL HISTORY.**

Linnéus placed the genus Sus between Hippopotamus [River-Horse] and Rhinoceros, in his order Belæae, which order stands between those of Pecora and Cete, in his last edition of the Systema Naturæ.

Cuvier arranges the Cochones (Sus, Linn.) under his ordinary Fæchiformes. This genus comprises the subgenera Sus, Phacochoerus, and Dicolytes, and stands between Hippopotamus and Anoplotherium, which last is followed by Rhinoceros.

Rügger arranges Sus as the only genus of his Setipora, his last family of his fifth order Mutilagina, which order is immediately preceded by the Nasuta, consisting of the genus Tapirus. The Solid sguláta immediately follow the Mutilagina.

Mr. Swainson divides the Ungulata (Hoofed quadrupeds) into two tribes: 1. Pungydromes; 2. Anoplotheres. He places Sus, Phacochoerus, and Dicolytes in the second tribe, in company with Tapirus, Paleotherium, Lophodon, and Anoplotherium, with Xiphodon and Dichobones (Dichobus), as the subgenera of the last. [Anoplotherium; Paleotherium.]

**EUROPEAN SUIDE.**

All zoologists seem to agree that the domesticated hogs are the descendants of the wild boar, Sus Sercofa, Linn.; Sus Aper, Briss.; Le Sanglier of the French, still an inhabitant of many of the temperate parts of Europe and Asia, but no longer existing in a natural state in the British Islands.

**Dental formula:** Incisors 6; canines 1-1; molars 7-7 X 4 = 44. (See the cut, p. 243.)

The wild boar, which is too well known to need description, and of which living individuals are often to be found in our meagreies (where by the way they are staved up on a floor of flagstones, instead of being allowed small paddocks and access to water, where they might turn up the ground, wallow, and live in something approaching to comfort), harbours in the most solitary places in retired forests. His hair is generally in some wild and reemotest, not far from water, and commanding by some deviuous path access to the open country. The young, or marascines, as they are termed by the French, are striped with longitudinal bands.

Throughout Europe the boar was held in high estimation as a subject. Noble families and even kings delighted to take the field with the boar-spear, and peril their persons in hunting this fierce animal. In our own country, where it formerly roved in the dense forests which have now vanished before the inroads of an increasing population, the loss of his eyes* was the punishment inflicted by William the Conqueror on him who was convicted of killing a wild boar. In the vast forest which so late as Henry II.'s time stood on the north side of London, were stags, fallow-deer, wild boars, and bulls. In the Lages Wallisce it appears that Howel-dda gave permission to his grand huntsman to chase the boar from the middle of November to the beginning of December. The speer has given way to the rifle; but in India, where the field is taken on horseback, the spear is still used, and hog-hunting appears to be one of the most exciting of the wild sports of that land of the soot.

An attempt was made in 1840 by Charles I. to restore this noble game to England; and he turned out several wild boars in the New Forest: but the wild boar was no friendly test for the experiment, and they were all destroyed. More recently Mr. Hume has driven wild boars and sows from Germany, and turned them into the forests of Walmer and Alice Holt or Ayles Holt, 'to the great terror of the neighbourhood,' as White says, in his 'History of Selborne,' and, at one time, a wild bull or buffalo: but the country some years upon its.

We can see no reason why the boar should not be introduced into some of our royal forests at least. It would not be more dangerous than the stag or the deer; and unharbouring the boar, with all the accompaniments of the spear and the rifle, and the grand boar-hounds, such as we see in the pictures of Snodrys, would be sport worthy of a prince.

The different domestic breeds, and the economical part of the subject, are treated of in the article Hoo. But, according to Pennant, and it has been observed, it has never been even during its life. 'It has been applied,' says that author, 'to an use in this island, which seems peculiar to Minorca and the part of Murray which lies between the Spey and Elgin. It has been there converted into a beast of draught, for I have been assured by a member of that country, eye-witness to the fact, that he had, on his first coming into his parish, seen a cow, a sow, and two Truges (young horses), yoked together, and drawing a plough in a light sandy soil; and that the sow, at the last of the best domestic breed of Minorca the sow and the hog are common bputies, and are yoked together in order to turn up the land.'

The senses of the hog are acute, especially that of smelling. The broad stout ploughs up the heritage; and not a root, an insect, or a turn escapes the olfactory sense. If fairly treated, it is by no means a dirty animal; but it is often too staved up in its own filth. There are few more pleasing scenes in the farm-yard than a well laid-out piggery properly kept. The animal itself is capable of much attachment where kindness is shown to it. That it is docile the number of learned pigs proves; and still more the famous sporting spaniel, that went regularly out with the gun, and stood her game as staunch as any pointer. In short, the hog is trained on the Continent to hunt for truffles.

**ASIATIC SUIDE.**

Genus Babyrusta, F. Cuv.—M. F. Cuvier has separated this form from Sus, relying upon characters, one of the principal of which is the upward direction of the alveolus of the upper canine tooth, which is enormously developed, ascending upwards, and curving back upon itself; the first upper grinding tooth is a false molar, and the two first below have the same character. The canines of the lower jaw form long, and, as compared with the other tusked Suide, slender tusks, as the animal advances in age.

**Dental formula:** Incisors 6; canines 1-1; molars 7-7 = 44.

There is but one species of Baby-rusta (literally Hog-deer) or Babirousta, and is it frequently written. This is the Babyrusta alfrans of modern authors, Sus Babyrus of Buffon, Le Sanglier des Indes Orientales de Brissius, and Le Cochon Cerf of Lesson and other French authors.

**Description.**—The Babirousta stands high upon its rather slender legs. The skin, which is of a greyish tint, inclining to fawn-colour on the belly, is very finely furnished with hair. The upper tusks come through the skin of the muzzle, and form nearly a circle directed backwards, often touching each other.
ing the skin again on their downward curvature. The females are smaller than the males, and are without these tusks.

Piso, in his edition of the 'Natural and Medical History of East India,' by Bonitus, remarks, that sedulous as Bonitus was, he had made no mention of this animal. Piso however supplies the deficiency, and gives in the page no very bad figures of the animal and of its skull. In the frontispiece however, where the Babiroussas occupies a conspicuous place in the foreground, the painter has evidently had the hog-deer in his mind, and has taken a few liberties with the animal's muzzle, aspect, and bearing, though the tusks are tolerably correct, lengthening its neck not a little.

The Indians, Piso tells us, acribe these animals to a union of the hog and the deer. He says that they are only found in the island of Bouro, thirty miles distant from Amboyna. He adds, that the Babiroussas is swift and fierce, and that its flesh is highly prized (inter delicias expatia) by both natives and foreigners.

It still inhabits the marshy forests of the island of Bouro, and is said to be abundant in the Moluccas, and a few other islands of the Indian Archipelago.

M. F. Cuvier has given very good figures, and a lively description of two males and females brought to France in the Astralabe, and kept in the Paris Menagerie. The female was much younger and more active than the male, which was aged and very fat, and spent his short life in eating, drinking, and sleeping. The female bred once after her arrival in Europe. When the male retired to rest she would cover him completely over with litter, and then creep in under the straw to him, so that both were concealed from sight. They died of diseased lungs about three years after their arrival.

M. Lesson states that in captivity the Babiroussas is restless and fierce, a character which is certainly not deserved by the young male exhibited in the garden of the Zoological Society in the Regent's Park, which appears inclined to be familiar, and likes to be noticed. This individual gets under the straw in the manner described by F. Cuvier. Indian corn seems to be a favourite food in confinement.

The lower tusks must be formidable weapons, though not so destructive as those of some of the other Susidae. In old individuals the upper tusks can hardly inflict a wound; they may perhaps ward off the bushes from the eyes of the animal as it rushes through the thick cover of its retreats.

Here we may notice the species figured and described by M.M. Lesson and Garnot, in the Zoologie de la Coquille, under the name of Sus Papuensis.

This new species, the Bins of the natives of New Guinea, is described as being remarkable for its small stature and its agreeable and slender form. The canines of the upper jaw are very small, and nearly of the same form as the incisors; the bristles are rather thick, short, yellow, and brown, some white above and annulated with black; the tail is very short. The young (maccaronsis) are of a brown colour more or less deep, with five rather bright fulvous stripes upon its back.

The length of the Papuan Hog is three feet. It is common in the forests of New Guinea, and the Papuans highly esteem its flesh, which the French found excellent. The natives catch the young in the woods in order to rear them in a kind of domestication.

M. Lesson remarks that the Sus Papuensis has many points of analogy with the Pecoraries, and seems to be intermediate between them and the true Hogs. The individual described by M. Lesson had only thirty-six teeth; perhaps, he observes, four molars were still to be developed, which would raise the number to forty.

AFRICAN SWINE.

Genus Phacochoerus, or, as it is written by some, Phaco-
ccherus, F. Cuv.

Generic Character.—Feet formed like those of the true Hogs; two trigonous incisors above, six small ones below; tusks lateral and directed upwards, very large; molars composed of enamelled cylinders enclosing the osseous substance and joined together by a cortical substance; very large flashy warts or wens on the cheeks; tail short.

Dental Formula:—Incisors 2 or 0; canines 6 or 0; molars 3—3.

3—3 = 16 or 34.

M. F. Cuvier remarks that we have here arrived at a system of dentition entirely different from that of the true hogs (Sangliers), and which announces animals endowed with a particular nature, and much more herbivorous than omnivorous. Nevertheless, in the locomotive organs the true hogs and the Phacochoeres bear the greatest resemblance to each other, and have accordingly been united in the same genus, as far as these organs served for the principal basis of the formation of generic groups. At present, he observes, but two Phacochoeres are known, and one has incisors, whilst the other appears to be deprived of them.

We have seen, he remarks, that in the Pachyderms there is but little regularity in the number of the teeth; and he inquires whether this may belong to the nature of these animals, or to lacunae which it has not been given to us to fill up; a question which he will not decide. Therefore he does not separate these animals. In the upper jaw the incisor is described by M. F. Cuvier as hooked, and very distant at its root from its congener, but as approaching it at its crown. The canine is a powerful

* A third species is now recognized; and, we believe, all three are in the British Museum.
or *Quaquagomay.* 'quomiam est montanus,' by Fernandez. Both notice the gland on the loin; and the latter, who repeats the Mexican names first above stated, remarks that it is a fierce and turbulent when first taken, but mild when tamed, 'et anus miscus domestico, batoque in delicis.' The flesh he describes as similar in flavor, color, and texture, but harder and not so sweet, and the food of the animal as consisting of acorns, roots, 'and other mountain fruits,' as well as worms, earthworms, and other creatures of the same sort that the capybara eats. The Mexican Hog, he adds, lays waste the cultivated fields, if they are not driven from them, go in droves, and when domesticated are fed on the same esculents as the common hog.

The, whose figure is not so good as that in Hernandez, describes this species, under the name of *Tajassou,* a wild pig, but yielding in size and firmness to the boar, and scarcely acquiring the size of domestic hogs. He speaks well of its flesh: 'Admiration probat is carnis, ut facile nostris domestisorum superet; lato est tenere atque *bove* & also alludes to the gland, combating the notions that it was an umbilicus or a mammary organ. In many regions of America, especially in New Spain, many boars of this nature and conformation are, he tells us, found, and the flesh is equally approved of: 'that it may keep the better, the gland, he remarks, ought to be removed as soon as the animal is killed, otherwise it soon becomes corrupt. He characterizes these *Peccaries* as insensible and revengeful; for, when they are wounded, they call together an infinite number of others, and continue in this way, whether hunters or tigers, against which they exercise a perpetual enmity; so that it never happens that the most insatiable hunters are obliged to save themselves and their horses, and to cut off the head of the animal, lest it fatness. The hunters, surrounded by these irritated numbers, clay them in safety with hunting-spears or fire-arms; but it is long before the Peccaries break up, and not before the hunters have been well attended to.

These descriptions may apply to the Collared Peccary, *Dicotyles torquatus,* Cuv.; but we shall presently see that the original species, *Dicotyles labiatus,* Cuv., show their hostility to their enemies in the same way, and the descriptions professedly refer only to this species.

The Collared Peccary has been bred in a state of domestication in South America and in some of the West Indian Islands; but, notwithstanding the favourable accounts given of its flesh by the author whom we have last quoted, it is a hardy, cruel, and destructive animal, suitable for both hog, both in favour and fatness. The comparative inferiority, too, of the Peccary, which only produces two young at a birth, is at once a bar to its superseding the domestic pig, which is equally fertile in all its parts, and where it has been introduced, to a high extent of a pig, or a horse, and is the most valuable animal, best and trim as it generally is, a nuisance in life and favouring the flesh, unless removed immediately after death. *D'Azara* however seems to have revelled in its said, and yet weighs more than fifty others; appear to have considered it agreeable enough. Those which we have seen in captivity have been positively offensive; and the Peccaries seem to have affected the offactory organs of Buffon, Sonnini, and indeed all other modern authors, in the same disagreeable way. The species is the *Patria* of Sonnini, and the *Tajetou* of *D'Azara,* according to Mr. Bennett.

Locality, Habits, &c.—Mexico and nearly the whole of South America, where they haunt the thickest and greatest forests of trees or woods of other animals. Not common in the vicinity of villages, to which they are bad neighbours, devouring the crops of maize, potatoes, sugar-canes, and manioc.

*Dicotyles labiatus,* or *D'Azara* **Peccary** appears to be the first who discovered the two species of *Peccaries,* which are both confounded by Linnaeus under the common name of *Sus* *tajassou.* Indeed the old writers above quoted seem to have fallen into the same error; for it is very improbable that the common *Sus* was known by the ancients. Cuautemoc, who first gave the scientific specific names now used, states that *Dicotyles labiatus* is the *Tajetou,* *Tajassou,* &c., as well as the *Tajetou* of *D'Azara.* It is larger than the *Collared Peccary,* which is seldom more than three feet long, and at a weight of more than fifty pounds. When assembled in large numbers, he is sure to be surrounded by multitudes, and torn to pieces by their tusks, if he is so unwise as to neglect his only chance of escape, which consists in climbing a tree, and thus getting fairly out of their reach. The smaller bands are by no means equally courageous, and always take to flight at the first attack.

M. Lesson remarks that this species has been nowhere more particularly observed than in Paraguay.

In Guiana, they are often surprised by a herd of *Peccaries,* exasperated at the havoc made among them by the fusils of himself and his companions. Beating himself to a tree, he beheld at his ease how they encouraged, by their grunts and gnawing sounds, tusks together, those which were wounded from above, and in various ways destroyed their ground with bristles erect and eyes fiery with rage. They sometimes stood an incessant *jastilage* of two or three hours before they quit the battle-field and left their dead to the conquerors, if after such slaughter they attempted to fly. A great gridiron, so to speak, of sticks fixed in the ground and some feet in height, with numerous small branches laid on it in a transverse direction, is got ready. On this sylvan cooking-apparatus the carcasses of *Peccaries* are dried over an open fire during the night. Sonnini dwells enthusiastically on these forest feasts, to which he looks back with regret.
SUI

Fossil Suidae.

Fossil remains of this family have been found in the second division (Miocene of Lyell) and the third and fourth divisions (Pliocene of Lyell) of the tertiary deposits. In the first of these divisions are to be noticed the three species of Sus found in the Ellipse sand. Bones of swine occur frequently in the bone cavae and bone breccia.

The following porcine remains are noticed by Hennem von Schorlach: Sus pleistocenicus, Curv., from the bone cavae (Hutton Cave on Mendip for example) and the bone breccia; Sus priacus, Golgi, from the bone cave at Sundwick in Westphalia; Sus (Aper) Arvensis, Croë and Joff., from the Furse-en-Dunois; Sus (Aper) Gmelinius, from the Ellipse sand; and remains of Sus (Bourd) from the tertiary. (Mm. de la Soc. Lin. de Paris. iv.)

Here we may notice Charopatomus [Pachydermatia], a fossil genus allied to Sus, and in some respects, especially in the dental details, approaching nearest to Dicynodon.

The following species have been detected:—
Charopatomus gypaorum, Desm.; Charopatomus Parisiensis, Von Meyer, from the gypaum at Montmirail (Cur.); Ca. Mooreri, Von Meyer, from the Brabant, Sc. land; Ca. Sommeringii, Von Meyer, from the tertiary (Lacustris) of Georgensmund; a Charopatomus ? detected by Clift from the banks of the Irawadi (Geol. Trans., vol. ii., 2nd series), by Fischer (Essai sur le Fossilien des Serres de la Chaine des Alpes), and by further Professor Owen's paper On the Fossil Remains of Charopatomus, Palaeotherium, Anoplotherium, and Dicobotax, from the Eocene formation, Isle of Wight, wherein the type of Charopatomus is characterised, on more ample data than had hitherto occurred, as Charopatomus Cauferi. (Geol. Trans., vol. vi., 2nd series.)

Professor Owen has also characterised, in the same volume of Geol. Trans., a new form (Hyracotherium), whose skull was probably intermediate in character between that of the hog and the Hylax, under the name of Hyracotherium leporinum, from the London clay at the stuary of the Thames.

Dr. Lund remarks, that there are but two genera of Pachydermata at present belonging to Brazil, the Tapir and the Pecary. Among the immense quantity of bones referrible to the latter genus, he says he can make out at least four species, very distinct from each other, and equally so from the two recent species, one of the fossil species nearly doubling in size either of the recent.

For Anthracotherium, which may be perhaps looked for having notice there is no Palaeotherium. SUIDAE (Zoödoc), a Greek lexicographer. Strabo (p. 329, Cassab.) speaks of a Suidas who wrote an historical work on Thessaly, which is also cited by the scholiast on Apollonius Rhodius, and by Stephanus of Byzantium; but it is probable, says Sir J. F. R. Stephens, that this Suidas was the person who wrote the Lexicon which goes under the name of Suidas. Eustathius, in his 'Commentary on Homer,' occasionally quotes Suidas the lexicographer; and as Eustathius lived about the end of the twelfth century A.D. and the beginning of the thirteenth, we may conclude that the lexicographer Suidas was at least prior to this time. There appears to be no certain indication in the Lexicon of Suidas which will show who he was or what his country. There are indeed passages in this work from which it appears that he lived during or after the reign of Alexius Comnenus, for he quotes Michael Psellus (v. Γνώριος; v. Δισσιος; v. Χρυσός); and if these passages were inserted by Suidas, he must have lived not earlier than the close of the eleventh century A.D. (But see Gaisford's edition.) In the article 'Adidas' he gives a chronological epigeme, which he closes with the death of the emperor John Zimiscus, who died A.D. 974; and in another place (v. Κωνσταντίνων) he speaks of Eustathius, his brother Constantine, who succeeded John Zimiscus. From his other passages and some inferences as to his age might be derived, but it is often difficult to know when the lexicographer is quoting others or speaking himself. Whatever may be the age of the compiler of this work has an appearance of having received additions from a variety of hands.

The work of Suidas is a Dictionary arranged alphabetically, but with some deviations from the strict alphabetical order. It contains both proper names, as names of persons and places, and words which belong to a dictionary of a language in the modern acceptance of that term. Among the names of persons there are names both from profane history and from sacred history, such as Abimelech and Abigail.

The work is exceedingly imperfect in all the classes of names, and appears to have been formed on no plan. Some of the articles are long and tolerably complete; others are very short and contain no information. Thus, for instance, "Abanoc" [Abydos] is given with a number of references to the ancient writers, but in another place (v. Αβανος) nothing beyond this is said, and the former is far preferable.

The work is compiled from numerous writers, some of whom are mentioned in a list prefixed to the Lexicon, comprising twelve names, among which, in the first place, appear "Nepos" and "Praefectus," and after them are "Thech" and "Zacharias." It is, however, extremely improbable that this list was made by the compiler of the Lexicon. Much more copious catalogue is contained in the edition of Köster. Among the old scholiasts, none was used by the compiler more freely than the scholiast on Aristophanes; but the work of Suidas is a catalogue of persons and places which are not in the extant scholia on Aristophanes. The work is not only deficient in plan, but is often defective and inaccurate in the execution. Numerous corrupt and base words have been introduced from bad authorities or bad copies, and have, in many instances, altered the meanings of many words. It also contains numerous passages of ancient writers that are lost. As to the biographical notices, it has been conjectured that they have all been taken from one work, which is further conjectured to be the 'Onomasticon' of Cassianus, and contain a catalogue of men distinguished for knowledge, and it is stated in the Lexicon (v. Ἡρωδιός) that it is an epitome of the work of Herodius of Mileius, who lived in the time of the emperor Anastinus; but this attribution is not well founded, without admitting that it is the only source from which Suidas derived even his literary notices. (See the notes of Köster, and Naecke.)

There is an unpublished epitome of Suidas by Thomas of Crema, entitled "Suidas mit dem Pachydermata," manuscript in the University of Geneva, 1523, is said to have made a Latin translation of Suidas (Fabricius, Biblioth. Med. et Inf. Lat.); but see the note in Fabricius (Biblioth. Graeca, vi. 402, ed. Harle.)

The first edition of Suidas was by Deimotrius Chalcondylas, 1544, fol., without a translation: this edition differs in some passages from that of Chalcondylas, whereas it seems probable that it was printed from a different manuscript. The edition of Adus was reprinted by Froben, at Basel, 1544, fol.; also without a translation, but with the correction of some typographical errors. H. Wolf made the first Latin translation of Suidas, published by G. Valckius, at Leyden, 1644, fol., without the Greek text, and the revised translation, printed against 1548, 1584. The first edition of the Greek text with a Latin translation was by Aemilinius Portus, Geneva, 1619, 2 vols.; the Latin version was new. In 1705 the edition of Köster appeared at Cambridge for Thomas Gaisford, with an improved version of Portus and numerous notes. The foundation of this edition is the text of Portus, which was corrected with the help of MSS. The preface of Köster contains a dissertation on Suidas, and on the previous editions and manuscript copies of Suidas, from which some inferences as to his age might be derived, but it is often difficult to know when the lexicographer is quoting others or speaking himself. Whatever may be the age of the compiler of this work has an appearance of having received additions from a variety of hands.

The work of Suidas is a Dictionary arranged alphabetically, but with some deviations from the strict alphabetical order. It contains both proper names, as names of persons and...
Milan edition. He has also generally noted the emendations of Portus, many of which Küster adopted without any remark; indeed Küster is accused, and justly, of taking the notes also of other scholars without any acknowledgment. Gaafard has carefully indicated the sources from which Suidas derived his information; he has reprinted most of Küster’s notes. The third volume of Gaafard contains the Index Klísterianus Rerum et Namnion Propriorum quae extra seriem suam in Suidae Lexicorum occurruunt, and then follows the new indexes. One of these two new indexes contains all the words in Suidas that fall into the grantries of the entries; the other contains the words which is useful because the Lexicon does not always follow the usual alphabetical order; and it also contains other words which do not appear in the alphabetical order of the Index. The compiler of these two indexes is an index of the writers who are cited by Suidas. This edition is a splendid and valuable work.

Various critics have laboured on the text of Suidas, among whom Toupi is perhaps the most conspicuous for acuteness and diligence. (Fabricius, Bibloth. Graeca, vi. 399, ed. Harles; Ludolphi Küster Praefatio; Praefatio Editoris Osmantiacis.)

SULISTET, R., lived about the middle of the fourteenth century, and was educated at the University of Gaafard. He is printer of a work printed at Venice in 1405, and again in 1599; the latter edition, the only one we have met with, is entitled Subilissimi Ricardi Suideti Anglici Calculationes noviter emendata atque revisum. A complete analysis of a new philosopham which seems to have been divided by the strong style of the early days of the Fausti, the antient Elaea, at the mouth of the Thesprotian. On the south-east the highland of Suli is bounded by the plain of Aita, which extends to the gulf of the same name. Towards the north Suli borders on the district of Paramithia, and is in the county of Asopus. The river Glyky, the antient Acheron, coming from the north, flows along a deep valley which intersects the highlands of Suli, and after being joined by several streams, enters the Ionian Sea. At Corfu, near the spot where the river enters the sea, is a Roman ruin known as the Temple of the Thebaid, of which ten or eleven are in the highlands, and the rest in the plain at the foot of them. The principal village, called Megali Suli, and by the Turks, Kasso Suli, lies on a hill east of the town, near the left bank of the Acheron; not far from it is the village of Kipha, and higher up the mountain is that of Kungi. In the plain, at the foot of the mountain, the principal village is called Securates. The whole population of Suli, at the time of the first British visit, was reckoned at 13,000, which in Suliotes is more than 12,000, divided into about thirty tribes or clans, each consisting of several families related or allied to one another. The principal tribes were the Zovela, Botzari, Zerva, Pasati, and Deak. The chieftains, known as the Deka or the Lord’s captains, led their contingent in war, subject to a supreme commander, a styled Polemarh, who was chosen by votes for the time. Their mode of fighting was that of partisans or skirmishers, and they were generally good marksmen.

The oral language of the Bileotes is the Albanian, but they use the modern Greek for their written language. They all belong to the Greek or Eastern church. Their appearance and costume resemble those of the Albanians, but their social habits and traditions are more like those of the Albanians of the north. The mountains of Suli produce only pasture for cattle and timber-trees, but the plain is cultivated, and produces corn, pulse, and other provisions. The houses are rudely built, and the country is altogether poor; but the almost continuous line of war hedges, directed towards their neighbours, before their total subjugation, gave them the means of supplying their wants.

Suli has become an historical name on account of its long struggle against the forces of Ali Pasha of Janina, at the end of the last and in the beginning of the present century. The political condition of Epirus, or Southern Albania, previous to that epoch, was very peculiar. The country was divided into two pashalik, Janina and Delvino; but several districts, such as Suli and Chiamvi, were independent of Ali Pasha, and on the other side, the Turks had a stronghold at Paramithia, near the port, but often at variance with the pashas. Lastly, there were the Venetian possessions of Preveza, Parga, and others.
trinity, along the coast, supported by the Venetian garrison of Corfu, and protected by the Venetian navy, which acted indirectly as a check upon the arbitrary power of the pashas, affording a refuge to those who escaped from their persecution, and also a market and place of supply for the Christian population of Ephesus. The whole maritime coast of Ephesus was in a manner under the protection of Venice. By a treaty between the Porte and the Venetian senate, no Turkish armed ship was allowed to sail within five miles of the Adriatic, and the pashas of Ephesus were even forbidden from constructing any battery within a mile of the coast.

In the war between Russia and the Porte (1787-92), the Suliotes were among the most active partisans of Russia, and took part of the interest of the Venetian republic against the Ottomans, which broke out in various parts of Greece. Ibrahim Pasha of Avlona, and several boys of Ephesus, favoured the insurgents. In 1789 Ali Pasha of Janina sent a considerable force against the Suliotes, who defeated it with great loss. In the following year, the Suliotes having joined with the Klephts of Pindus and other mountainous districts, ravaged Acarnania as far as the Achelous, without distinction of Greeks or Turks, and they afterwards overran the territory of Arta and Janina, under the very eyes of the Suliotes. Sulla sent money to the naval armament of the corsair Lambro Canzani, who scourèd the Aegean Sea against the Turks. But the peace of 1792, between Russia and the Porte, left the Venetian power in the Adriatic unimpaired by the fall of the Venetian protection of the Ottomans, gained of Ibrahim Pasha, of whom nothing is known, except that he was not a man of any great property. (Plut., Sulla, 1.)

4. L. CORNELIUS SULLA FELIX, the son of L. Cornelius Sulla (4), was born in B.C. 138, in the consulship of P. Cornelius Scipio, Narsis, Serapio and D. Junius Brutus Gallicius. When a young man he lived for a considerable time at Rome in lodgings, and in the same house with a freedman, which was looked upon as a proof of his limited means. But he appears nevertheless to have received an education as good as those of the Roman nobility. His name was Cornelia. He had acquired a considerable knowledge of the Roman laws, and, being a person of marked talents, he was enabled to enter into competition with others for the honours of the republic. In B.C. 107 he was appointed questor, and was sent with a detachment of horse to join the army of Marcus, who was then carrying on the war against Jugurtha. But the first campaign was not so successful as it had been expected to be, and it was only improved, he was enabled to enter into competition with others for the honours of the republic. In B.C. 107 he was appointed questor, and was sent with a detachment of horse to join the army of Marcus, who was then carrying on the war against Jugurtha. But the first campaign was not so successful as it had been expected to be, and it was only the consequence of which was that Jugurtha was treacherously delivered up into the hands of the Romans. (Sallust, Jug. 102-113.) Sulla was so proud of having subdued the Numidian king, so famous for his cunning and perjured, that he proposed to give him a triumph. But B.C. 102, he was elected consul in the year of theVintage of the Romans, and was superior to his cousin Sulla, who was elected consul in the same year. (S., Jug. 107.)

When Sulla, in his second consulship (B.C. 104 n.), undertook the war against the Cimbri and Teutoons, he made Sulla his legate, who distinguished himself by making Cimbri, a chief of the Cimbri, his prisoner. The year following Sulla remained in the camp of the Cimbri in Gallicia, where he distinguished himself. But in the year of theVintage of the Romans, Sulla was elected consul in the same year. He was superior to his cousin Sulla, who was elected consul in the same year. (S., Jug. 107.)

When Sulla, in his second consulship (B.C. 104 n.), undertook the war against the Cimbri and Teutoons, he made Sulla his legate, who distinguished himself by making Cymbelius, a chief of the Cimbri, his prisoner. The year following Sulla remained in the camp of the Cimbri in Gaul, where he distinguished himself. But in the year B.C. 102, he was elected consul in the army of Lucius Catulus, the colleague of Marius, who was stationed with a force in the north of Italy. Plutarch ascribes this command of the horse, and of pretation of the army, to the jealousy of Sulla, lest his own fame might be eclipsed by that of his tribune. But the real cause of this movement was in the actual state of things. Sulla must have been aware that in the army of Catulus, who, although a good man, was not an able general, his services would be much more useful in a much greater sphere of activity for his talents as an officer in the army of Catulus than in that of Marius. If there existed an ill-feeling at all, it is much more likely that the aristocratic Sulla felt indignant at a plebeian being elected consul uninteruptedly one year after the other. Sulla, while in the army of Catulus, was the soul of all under

However, as Rufus and Sulla have the same meaning, it is more probable that the change of the one name for the other was only an arbitrary alteration. Plutarch (Sulla, 2) states that the dictator Sulla was the first who wrote this title for himself. It is evident that Plutarch had read the memoirs of the dictator, or at least part in which this point was explained, very carelessly.

2. P. CORNELIUS SULLA, a son of the former (1), was prætor in Sicily in the year B.C. 186. (Livy, xxxiv. 6, 8.)

Sulla was a man of the Sullae, and son of Sulla Sulla (2). In the year B.C. 167 n.c. he was one of the ten Roman commissioners who, after the defeat of Perseus, were sent to Macedonia to arrange the affairs of that country. (Livy, xiv. 17, 3.)

5. L. CORNELIUS SULLA FELIX, the father of the dictator Sulla, of whom nothing is known, except that he was not a man of any great property. (Plut., Sulla, 1.)

1. PUBLIUS CORNELIUS SULLA (Gellius, i. 12, § 16), who was Praetor Urbanus, in 212 n.c., and, in accordance with an oracle of the Sibylines books, conducted the first celebration of the Ludi Apollinaris. Hence he is said to have received the surname of Sibylla, which was subsequently contracted into Sylla or Sulla. (Macrobi, Sat., i. 17.) This account
takings, and he made several successful expeditions against the Alpine tribes. On one occasion, when the army of Catulus began to suffer severely from want of provisions, Sulla contrived to obtain such plentiful supplies, that Catulus was enabled to send some to the army of Marius.

After this, the Senate, on the 1st of November, 88 B.C., declared Sulla returned to Rome, where he resumed his old course of life. He did not come forward as a candidate for any public office until the year B.C. 94, when he was a candidate for the praetorship. But he was not elected, because, as he himself stated in his Memoirs, with much offensiveness of tone, he was aggrieved at being passed over in preference to others, as they expected that on entering on the sedileship he would amuse them with magnificent games, and exhibit African beasts in the Circus, as it was known that he was a friend of Bocceius, who would easily procure for him rare and extravagant beasts. He then left Rome, and for several years, 93 however, gained his object by canvassing and bribing; he was made praetor urbanus (στρατηγὸς πολεως, Plut.; comp. Aurel. Vict., De Vit. Illust., 75), and exhibited to the people the games which they had expected from his sedileship, (Plut., Hist. Nat., vi. 9.) This year after his sedileship he went as proconsul to Cicilia with a commission to restore king Ariobarzanes to his kingdom of Cappadocia, from which he had been driven through the influence of Mithridates. This object was soon accomplished; and this bold exploit added to his fame. In B.C. 91, Sulla marched, with a part of his troops, through Asia, and was defeated by the first Roman to which such an application was made by a Parthian king, treated the ambassador with haughtiness and arrogance. In B.C. 91, when Sulla returned to Rome, Caius Censorius brought against him the charge of repe-}

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most numerous, would have carried the day, but Sulla, who was with his army in the neighbourhood of Nola, returned to Rome, and in order to put an end to the violent proceed-

ings in the Forum, he and his colleague proclaimed a justi-
tium for several days. But Sulpicius and his party, armed with daggers, appeared in the Forum, declared the procla-
ation of the consul was unlawful, and endeavoured to com-
pel them to repeal the justitium. This again increased the tumult, and Pompeius was obliged to take to flight, and his son, who had married a daughter of Sulla, was murdered. When the matter was referred to the tribunes, Sulla was dragged forth and compelled to repeal the justitium, after which he returned to his army at Nola. In the mean-
time the rogations of Sulpicius were carried, and the com-
mmand in the war against Mithridates was given to Marius. But when the message reached him, Sulla with orders for him to surrender the command, the soldiers, who loved Sulla, and who were of opinion that Marius would not lead them to Asia, where they expected a rich harvest of booty, called on Sulla to lead them to Rome. Several officers in the camp, who were opposed to civil war, retired to the city, while numbers of other persons flocked from the city to the camp of Sulla. All signs and omens, to which Sulla pretended to attribute great importance, were in his favour, and, with the declaration that he was going to reduce the city, he marched with great speed against the city, which he took by storm. A battle followed within the walls, in which Marius and his party were de-
feated. Marius escaped to Africa, and Sulpicius, betrayed his own country, and returned to the city. His col-
league on this occasion prevented the soldiers as much as possible from committing any outrage upon the citizens. Besides the two leaders of the popular party, ten others were declared enemies of the republic, their property was con-
trolled, and several were brought to trial, and put to death, and either to put them to death or to deliver them up to the consuls. (Appian, De Bell. Civ., i. 60; Plut., Sull., 10.)

After this defeat of the Marian party, Sulla repealed the laws of Sulpicius, but he had no leisure for a thorough reform of the constitution, which he appears to have con-
ceived about this time, as his soldiers were anxious to be led to Asia. Appian indeed ascribes some of the most impor-
tant regulations of Sulla to this time, and it is not impro-
bable that the law which provided that no measure should be brought before the people which had not previously ob-
tained the sanction of the senate, and another (lex unciaria; Fest., a. d. 'uncaria lex'), by which some disputes between debtors and creditors respecting the rate of interest were decided, belonged to this period. The measures here mentioned by Appian, may have been discussed at the time, but they were not carried into effect until the dictator-
ship of Sulla. He remained at Rome until the consuls for the year B.C. 87 were Cn. Octavius and L. Cinna. The latter was a man of the popular party, and Sulla, pretending to be glad to see that the people made use of their freedom in the elections, contented himself with making Cinna promise with an oath that he would not disturb the actual order of things. Sulla in the meanwhile felt that his life was not quite safe at Rome, and was therefore constantly accom-
panied by a strong body-guard. A short time after, the tribune M. Virginius, instigated by Cinna, prosecuted several of Sulla's friends, and, instead of removing him to Capua to undertake the command of his army, and to proceed with it to Greece, where he intended to com-
merce operations against Mithridates. He landed at Dy-
ryades, collected a Roman force, and marched towards Athens, which Archelaus, the general of Mithridates, had made his head-quarters. After a long siege and a desperate defence, Athens was taken by storm (85 B.C.), and the garrison of the Acropolis was soon com-

cerned, but Sulla, who afterwards related to his colleagues his daring and success, did not in the least object to the capture, as he attributed it to the fates. Piso also fell into the hands of the victor. (Plut. Sull., 11, 12.; Appian, Mithrid., 28-43.) Sulla, who received no supplies from Italy, did not scruple to make use of the rich treasures of the Greek republics, and, with the help of those who exorted him not to provoke the anger of the gods. Athens suffered severely, and many of its most magni-
ificent buildings and works of art perished on this oc-
casion, for Sulla's anger had been provoked during the siege by the insulting conduct of Aristeas, then tyrant of Athens. Archelaus collected all his forces in Greece, and
after having received great reinforcements from Asia, he was determined to disperse with Sulla the possession of Greece. Though the Roman army was far inferior to that of Archelaus, Sulla gained two victories, one at Chaeronea (S. D., 85 C. B. C.) and the other at Coroneus in Boeoia (85 B. C.), after which he destroyed the towns of Anthemus, Laryma, and Almisse. (Plut. Sull. 26.)

Although Sulla might now consider himself master of Greece, and might have marched on the war against Mithridates and the affairs of success or defeat, it did not drive Mithridates to extremities, and therefore consented, soon after his landing in Asia, to conclude a peace with him (84 B. C.) [Mithridates.] There were however other reasons for wishing to put an end to the war. During his absence from Rome, the popular party, under his father, was again annihilated: his institutions were abolished, his house was destroyed, and his property confiscated, and he himself was declared an enemy of the republic. He now concluded, that the distinguished senators had been obliged to take refuge in his camp in Greece, and they, together with his wife Cecilia Metella, who had likewise fled from Rome, urged and entreated him not to forsake them. Two years before the peace with Mithridates, the consuls Lucius Valerius Flaccus and Aurelius Cotta, the popular party, had appeared with a fleet and an army in the Ionian Sea, under the pretext of carrying on the war against Mithridates, but perhaps with the secret intention of attacking Sulla. This plan however had not been realized, for Valerius Flaccus was murdered by his soldiers, and C. Pomponius, who had placed himself at the head of the troops, and was successful in several engagements with the army of Mithridates. After Sulla had concluded a peace with the king in the plains of Troy, he set out against Firmia, and marched in station to the city of Thyrea in Lycia, which Firmia, being betrayed by his own soldiers, put an end to his life. (Plut. Sull. 25.)

Sulla was now at liberty to return with his army from Asia to Rome. He had fought for three years, and he could now satisfy himself that he had expected to enrich themselves in the war against Mithridates. To raise the necessary money, Sulla resorted to the most oppressive measures. Every provincial was obliged to give to every soldier quartered in his house every day a fixed sum of money, and to provide him and as many as he might choose to invite with a daily meal. Besides this, a very heavy contribution of 20,000 talents was raised; in short, Sulla treated the country, which he pretended to have delivered, like that of an enemy. (Plut. Sull. 25.)

Sulla had therefore returned the attachment of the people, he left the province of Asia, intrusted the two legions of Firmia to his legate L. Licinius Murena (Appian, Mithrid. 64), and sailed with his fleet and the remainder of his army, about 30,000, from Ephesus to Ionia. After a voyage of three days, he reached Athens. He took the library of Apollion, the father of Ariston, which, according to Athenaeus (v. p. 211, B.), belonged to Athenian, and which contained most of the works of Theophrastus and Aristotle, which was well all but a treasure, carried it with him to Rome. (Ar. Top.) While in Greece, Sulla had an attack of the gout, of which he was cured by the use of the warm baths of Abydos in Euboea. During his short stay there he indulged in his usual diversions, and spent the greater part of his time in the company of actors and dancers. He then marched with his army towards the north, through Thessaly and Macedonia to Dyrrachium, and carried his army over to Brundusium in 130 B. C. (Appian, De Bell. civ., i. 79.) in 1600 ships. This passage probably took place in the spring of B. C. 83.

The forces of the hostile party in Italy amounted to 300,000 men. (Vell. Pat., ii. 24.) Cincinnatus had increased his preparations as soon as he heard that Sulla was on his way to Italy. In consequence of a letter which Sulla while yet in Asia had addressed to the senate, it had been decreed that negotiations should be entered into in order to effect a reconciliation between the parties, and that the consuls, Cinna and Carbo, then consuls, should make no further preparations for war. But the consuls paid no attention to this decree, and made preparations for carrying an army into Dalmatia, in order to bring the war to a close in Greece. But the army, which was then sent to Dalmatia, a mutiny broke out among the soldiers, and Cinna was murdered, 84 B. C. (Appian, De Bell. civ., i. 78; Liv. Epit., 83.)

The popular party, deprived of their leader, had no alter-
houses which he had taken from their former owners. In the same manner as he thus secured for himself a strong party in the towns of Italy, he formed at Rome for the security of his own person a body-guard consisting of ten thousand slaves, to whom he gave their freedom and the franchise, and who were called, after their patron, Corneli. The people were therefore silenced by fear, and all the acts committed by the tyrant were ratified by the people. (Appian, De Bell. Civ., 97), and a gill statue, gual vented to him in front of the rostra, with the inscription 'Cornelius Sulla, Imperator Felix.'

Sulla was the second of a name an interrex, and Valerius Flaccus being appointed, Sulla made him propose to the senate to appoint a dictator to regulate the affairs of Rome and Italy. In accordance with his own expressed wish, Sulla was made dictator (a.c. 82), an office which had not hitherto necessarily been granted, and which was hitherto held as long as he pleased. In order however to leave to the people some appearance of liberty, he permitted them to elect consuls as usual, and he himself, in a. c. 80, held the office of consul in addition to that of dictator. In the year a.c. 81, he enjoyed for a passage, in which he victoried in the war against Mithridates, and his splendid games and festivities, which lasted for several days, made the people forget for a time their wretched condition. (Appian, De Bell. Civ., 101). After his triumph he claimed the surname of the people. Youth will probably never again care about such names; but even among the ancients, the care of the people was owing to the favour of the gods, especially of Venus, which he had enjoyed from his early youth. Hence he also called himself Epaphroditus. But although he seemed to the ancients a greater hero than any of their predecessors, yet he cared little about them, and he did not scruple to plunder their temples and to treat with scorn and contempt the signs which appeared to deter him from his sacrilegious actions. (Plut., Sull., 12.)

Sulla, who thus annihilated the popular party, began to direct his attention to a reform in the constitution and in the administration of justice. Zachariae, a great admirer of the political wisdom of Sulla, divides all his laws which are known under the name of 'Leges Cen-nelae' into four groups: 1. those which are connected with the persons of the people; 2. criminal laws; and 3. those which were intended to improve public morals.

The constitutional laws of Sulla were intended to restore the old aristocratic form of the republic, but such a restoration could only be a matter of form, as it had no longer hold in the hearts and minds of the Romans. As a politician, Sulla was one of those short-sighted men who believe that old institutions can be revived or preserved by the mere change of the name. The people thus gave stability to them, the spirit of the nation, has become entirely altered. The consequence was that the constitution of Sulla did not survive him many years. The principal part of his reform consisted in depriving the común tribune of his rights, and in regulating the right to elect the members of the publicans, which the people had exercised for so long a time. He left to the comun tribes the only power to elect the inferior magistrates, as tribunes, aediles, and quasistrates. The power of the tribunes of the people thus received a fatal blow. Some writers are of opinion that Sulla abolished the assemblies of the tribes altogether. The whole of the legislative power was given to the Comitia Censorata, but in such a manner that, no legislative measure could be brought before them, which formerly alone had the right to elect the members of the publicans, which the people had exercised for so long a time. He left to the comun tribes the only power to elect the inferior magistrates, as tribunes, aediles, and quasistrates. The vacancies which had occurred in the senate through the late dissensions were filled up by the admission of 300 of the most distinguished equites (Appian, De Bell. Civ., 100). [Senatus.] He increased the number of pontiffs and augurs to fifteen. [August.] Pontifex.

It appears greatest in his laws relating to the administration of justice. All the Roman writers agree that Sulla gave the judicuri (either the publica or private, or the former alone) to the senate. We cannot enter here into an account of the various laws relating to criminal and civil jurisdiction; but, before the time of Sulla, the criminal legislation of Rome was extremely imperfect, and he was the first who brought order and system into this important branch of administration; and this part of his reform was not abolished after his death, but most of his laws continued in force down to the latest times of the empire. His legislation embraced a great variety of subjects. A list of his laws, together with a critical examination of their nature and tendency, may be found in the works mentioned at the end of this article.

The laws which Sulla enacted, with a view to improve the state of public morals, related chiefly to marriage and luxury (leges sumptuarias). But Sulla, though anxious to improve the moral condition of the people, was the last man to observe any laws of the kind. (Plut., Sull., 35; Commod. Equest. de B.)

After the annihilation of all his enemies, and the establishment of a new order of things, Sulla once more felt a desire to enjoy those pleasures to which he had been addicted from his early youth, and without the interruption of which he could not be happy. He was addicted to the use of opium, and the almost constant study and use of the Sibylline Oracle. He therefore, his political power, and in 83, he retired to his country seat of Nemi. Accordingly, he did not consent to the consultation for the year a.c. 79, and soon after declared to the assembled people that he resigned his power and dignity of dictator, and that he was ready to render an account to them of the manner in which he had exercised it. As he might have been expected, no one ventured to take him at his word; only one young man is said to have dared to accuse him, and to have followed the ex dictator on his way home with bitter invectives, to which Sulla only made this calm remark: 'This is my first effect in favor of the public, I acquired great power, from being inclined to lay it down.'

The abdication of Sulla in the height of his power has called forth the admiration of both antient and modern writers; but a closer examination of the state of affairs in Rome and Italy, and a consideration of the disposition of Sulla, deprive this act of much of its apparent magnanimity. As regards his own inclination, it can only be said that his love of pleasure unnumbered by public service is the secret of his fall. His journey to Nemi was not his first; in the year 82, he went to Nemi with only one young man to take up arms for his patron at any moment, as their own safety depended upon his. The party of Sulla was in possession of the government, and the power of Rome, from the time of his abdication, was ready as to take up arms in his defence as the Corneli. He could therefore withdraw without any danger or fear, and, as he well knew he would be cleared by his own. Sulla, in his life, was at the time of his death, in the year a.c. 78, as at the age of sixty. The cause of his death is not quite certain. Appian (De Bell. Civ., 105) says he died of an attack of fever, while others inform us that the loathsome disease called phthisis was the true cause of his death. Sulla's death is mentioned by Plutarch, xxvi. 86; xi. 29; vii. 44; Aurel. Vict., De Vir. Illustr., 15; Paus., i. 20, 4.) Two days before his death Sulla had finished the twenty-second book of his 'Memoirs,' of which we probably possess a considerable part in his life by Plutarch. His body was buried in the temple of Rome, and his remains burnt in the Campus Martius according to his own request. A monument also was erected to his memory in the Campus Martius, with an inscription said to have been written by Sulla himself. (Plut., Sull., 36.)

Sulla was married three times, and left two children, Faustus Cornelius Sulla and Fausta, who were twins by his fourth wife Caecilia Metella. One daughter was born, after his death, by his fifth wife Valeria.

5. Faustus Cornelius Sulla, son of the dictator Sulla (5) and of Caecilia Metella (Plut., Sull., 34), was born in 89 a.c. After the death of his father he was under the guardianship of L. Lucullus. He was several times in danger of being compelled to restore the money which his father had until then appropriates to himself. He however always prevented an inquiry being instituted, as some of the body would have been compromised by it. In 65 a.c. a tribune of the people renewed the attempt, but Sulla again escaped, chiefly through the influence of Cicero, who spoke for him. (Cic., in Sull., 36; Plut., Sull., 12.3; Pro Cluent., 34; De Leg. Agr., i. 4.) He served under Pompey in Asia, and in 63 a.c. he was the first who scaled the walls of the temple of Jerusalem, for which act of
very bo was highly rewarded. (Joseph, Ant. Jud., iv. 4; Bell. Jud., i. 7, 4.) In n.c. 60 he gave to the people the glass he had obtained that he had been command to give to his father in his last will, and on this occasion he bestrair the people most munificently; he made them donations of money, and allowed them the use of the baths without any payment. (Dion Cass., xxxvii. 51; Cic., Pro Sulla, 19.)

In the year 48 B.C. he obtained the freedom of Rome which he had some years before been made a member of the college of augurs. (Dion Cass., xxxv. 17.) After the murder of Clodius, Faustus was requested by the senate to restore the Curia Hostilia, and it was decreed that after its restora-
tion he could call himself consul of the Roman people. (Dion Cass., 50.) Faustus Sulla did not obtain any higher office than the quaesitorship; his diisolute mode of life had ruined his fortune. As regards his political views, he had joined the party of Pompey, whose daughter he married. In n.c. 49 Pompey wished him to be sent as proconsul to Armenia, but it was prevented by the tribune Philippus. (Cic., De Bell. Civ., i. 6.) During the troubles of the civil war between Pompey and Caesar, Sulla's only object appears to have been to enrich himself; he was present in the battle of Pharsalus, and thence fled to Africa, where his fate was decided in the battle of Thapsus (46 B.C.). He attempted to escape to Spain, but was taken prisoner and delivered to Caesar, in whose camp he was murdered during a mutiny of the legions commanded by children of the lost Caesar. (Cic., De Bell. Afr., 95; Appian, De Bell. Civ., ii. 100.) Of his twin-sister Fausta nothing is known, except that she married twice, and each time was guilty of adultery. (Aseon, in Cic. pro Sest., p. 29.)

Sulla, a son of Servius Cornelius Sulla, was a brother of the dictator, and enriched himself considerably during the proscriptions. (Dion Cass., xxxvi. 27; Cic., De Off., ii. 8.) In n.c. 65 n.c. P. Cornelius Sulla and P. Antonius Pontius were elected consuls; but both were found guilty of ambitus (bribery), and deprived of their dignity. (Cic., Pro Sulla.) He is also believed to have been an accomplice of Catiline in his first conspiracy, and in n.c. 62 he was accused by L. Torquatus of having taken part in both conspiracies of Catiline, as he had known the former's intention lent him their protection, and Hortensio and Cicero spoke for him. The speech of the latter is still extant. Sulla was acquitted, but there is every reason for believing that he was guilty of the crime with which he was charged. Cicero's defense was entirely made without sparing any apprehension and embarrassment. (See also Sallust, Cat., 17.) Cicero subsequently fell out with Sulla, as the latter was to some extent involved in the crimes of Clodius. (Cic., Ad Att., 10.) The civil war between Sulla and his forces by the order of Caesar during the battle of Pharsalus. (Appian, De Bell. Civ., ii. 76; Cass., De Bell. Civ., iii. 51, 89.) In n.c. 47, when he was commanded to transport the legions destined for Africa from Italy, he was expelled with the rest of the legions by the soldiers of Gaia, and driven away, for before embarking for Sicily they claimed the money and lands which they had been promised during the campaign in Thessaly. (Cic., Ad Att., xi. 21, &c.) During the confusions and sales of property in the dictatorship of Sulla, Sulla acquired considerable wealth by the purchase of such property. (Cic., De Off., ii. 8; Ad Fam., xv. 19.) In the year n.c. 46 he died on a journey: some said that he had been murdered by robbers, others that he was of overreaching himself; but the people appear to have rejoiced at having got rid of such a worthless person. (Cic., Ad Att., ix. 10; xv. 17.) He left behind him a son, P. Sulla, and a son-in-law of the name of Memmius, of whom nothing worth mentioning is known. (Cic., Ad Fam., xv. 17; Ad Q. Prot., iii. 3; Pro Sulla, 31.)

8. SERVIIUS CORNELIUS SULLA, a brother of P. Cornelius Sulla (?). He took part in the conspiracy of Catiline (Sallust, Cat., 17, 47); but he was not condemned to death, although he so manifested his loyalty that one would undertake his defence. (Cic., Pro Sull., 2.)

The last person of any note bearing the name of Sulla in the history of Rome occurs in the reigns of Claudius II. and of Elagabalus. The emperor Claudius (Suetonius, Claud., 27; Tacitus, Annal., xiii. 23), and was consul in A.D. 52. According to the information of one Paetus, Pallas and Burris intended to raise him to the imperial power. This charge was found to be false; but Nero nevertheless dreaded Sulla, believing him to be a cunning and crafty person. Some false report subsequently increased this fear of Sulla, for in A.D. 59, sent him into exile to Massilia. (Tacit., Annal., xiii. 47.) But as the emperor apprehended that Sulla might there induce the German legions to revolt, he ordered him to be put to death, which took place in A.D. 63. (Tacit., Annal., xiv. 57.)

(Respecting the history of the family of the Sullas, see Orelli, Onomasticon Tulliamum, ii., p. 192, &c.; Drumann, Geschichte Rom's in seinem Übergange, &c., ii., p. 426, &c.; Pauly's Real-Encyclopädie der Altertumswissenschaft, ii., p. 668. Sulla was called dictator Sulla, and his legislation in particular, see Zachariae, L. Cornelius Sulla, genannt der Glückslic, als Ordnner des Römischen Preys- staat, Heidelberg, 1834, 2 vols. 8vo.; Vockeaster, Dis- Kurtius Sullan, Lipsiae, 1815, 8vo.; A. Wittich, De Ret Publ. Romae ex forma, qua L. Cornelius Sulla dictator totam rem Romanam ordinibus, magistratuibus, comitibus communitarii, Lipolae, 1834, 8vo.; and a Latin dissertation by C. Ramshorn, which bears the same title as the above, by Wittich, and was published at Leipzig, in 1835, 8vo.)

SULLY, MAXIMILIAN DE BETHUNE, DUC DE, born at Rosny, on the 13th of December, 1560, was descended from a younger branch of the family of Bethune, in the department of Eure-et-Loir. His father and brothers were both wealthy and powerful men, and wealthy marriages raised themselves to importance in their adopted country of France; but the grandfather of Maximilian had squandered away his inheritance, and left to his son nothing but a proud name and his mother's dowry. Francois Pachon, baron of Belleau, was a man of moderate fortune, but not possessed of sufficient talent to re-establish the family fortune, and his adoption of the Protestant religion, by alienating him from his relations, forbade all hopes of his inflating the capital of the house. Maximilian, his son, had a mind and body, and the cherished wish to see prosperity return to his house rested upon the second, the more energetic Maximilian. His expectations from this quarter were strengthened by the predictions of astrologers. The first edict of the king in 1570, by which the Catholic religion was voted himself to the aggrandizement of the family. The moral and religious tenets of the Huguenots were at the same time sedulously instilled into him. These early impressions moulded a strong, fearless, and enterprising character, and decided his career in life. In 1572 Francois de Bethune carried his son to the court of Henri, the young king of Navarre, then in his twentieth year, having previously commanded the boy in a solemn and impressive manner to live and die with the master he gave him. The king of Navarre accompanied the boy, who was at that time on his way to Paris, to conclude his matrimonial engagement with the king's sister. In Paris he paid his court daily to Henri, but resided at some distance. In the end of this year he was made successively captain of the guards, and in the following year a governor, and attended the classes of the College of Burgundy. By the assistance of the principal of that institution he escaped the massacre of St. Bartholomew, though the horrors of that night left a lasting impression on his mind. At the command of his father he continued to reside in Paris, but his literary studies were abruptly closed. His governor perished in the massacre; and his preceptor was too terrified to remain in Paris. The king of Navarre however supplied the place of the tutor with one who gave Rosny instructions in history and philosophy, and the rest of the boy's education, according to his own account, in learning to read and write well. He continued occupied with these pursuits till the beginning of 1575, when he accompanied Henri in his escape from the state of confinement in which he was kept by the French court.

The Protestants had by this time recovered from the dismay into which the massacre of St. Bartholomew had thrown them; had made common cause with their Roman Catholic and Huguenot friends in their objects in the state of the grievances; and had at last ventured to take arms again. The king of Navarre and the prince of Condé were in a great measure identified with the Protestant cause; and the duke of Guise and the king of Navarre were in a great measure identified with the Protestant cause; and the duke of Guise had at this time some cause of quarrel with the court, formed an alliance with the Protestants, and after the defeat of Henri these three princes found themselves at the head of a mixed army of Roman Catholics and Protestants, amounting to 35,000 men. The civil war, which imme-
diliately broke out, was continued with a few brief intervals of hollow trills till 1594. The studies of Rosny, who accompanied Henri in his flight from Paris, were finally broken off by that event. In his fifteenth year he was immersed in the toils and cares of active life; the death of his father about the same time left him entirely his own master. In his nine-teen years of civil war that he developed and cultivated without guide or master the character and talents which he displayed as minister of France.

At first Rosny accepted an ensigncy in the regiment of foot which was fought with great vigour, and the death of his brother, whose ghost haunted him. In the first skirmishes in which he was engaged he evinced so much temerity, that Henri was more than once obliged to rebuke him. It was only in battle however that he showed any degree of boldness; in the management of his pecuniary affairs he was prudent, and prudent he was.

The rents of his property and the booty he obtained in the storming of several towns, enabled him to maintain a small company of men-at-arms; and with these, resigning his ensigncy, he attached himself exclusively to the person of the king of Navarre. The courage and enterprise of so young a lad, the enthusiasm with which he sought to make himself master of the art of gymnure, and above all the prudence which he manifested in his domestic arrangements, left Henri no choice but to make him his confidential counsellor.

The king gave him the garrison of Rosny, a fortress in the rear of the Netherlands; and Rosny, having added to his name the title of comte, was made a councillor of Navarre in his twentieth year, with a salary of 2000 livres.

It was soon after this promotion that he was induced to make one in the return of the duke of Anjou, who had been inability to make his fortune. On leaving Anjou, he adopted the policy of mounting his troops; and during the year he resided in the country he extended his dealings, sending out agents, who purchased horses in Spain and other countries at more nominal prices, and sold them at a high rate of profit to the crown. As he saw the king's income increase, he hesitated to make the king a present of his merchandise, but he finally gave up the idea, and returned in 1583 to the king of Navarre, no otherwise benefited by his excursion to the Netherlands than by the acquisition of more knowledge of the world and greater experience in war. He was almost immediately dispatched to Paris to keep an eye on the intrigues there going forward.

In December, 1583, he married Anne de Courtenay, and spent the whole of 1584 with his young wife upon his estate of Rosny. Though retired from public life, he was not idle; he laboured at his gardens, and at his seat of Château-Neuf, which attracted Rosny was the promise of having his claims to the inheritance of the viscount of Ghent supported by the new king, and the opportunity of reconciling himself to the court. He was in fact an enigma, and Rosny, who was so quick in activity, was eager to be made a procurator in the court both, and returned in 1583 to the king of Navarre, no other wise benefitted by his excursion to the Netherlands than by the acquisition of more knowledge of the world and greater experience in war. He was almost immediately dispatched to keep an eye on the intrigues there going forward.

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close be deposited, in money, in the Bastille. When he undertook the management of the finances, in 1597, the treasury was empty and in debt; after the death of Henri IV., in 1610, forty-two millions of livres were found in it.

The method and regularity with which a grand intendant introduced into the general financial state a wish that he should lend his assistance towards bringing the other departments of government into similar order. He was appointed in succession to be grand-master of the artillery, director of the marine, master of the mint, and master of the finances; he was commissioned, in fact, sole minister of France. Six days of the week councils were held every morning and evening. On the Mondays, Thursdays, and Saturdays, the council of state and finance sat both in the forenoon and the evening; in the forenoon they decided on matters of war, of finance, of war, commerce, &c. Rosny attended all, and presided in all whenever the king was absent, which was frequently the case.

In addition to these duties of routine, he was frequently engaged in important negotiations. In 1661 he was delegated to meet Queen Elizabeth at Dover, where arrangements were made for an alliance against the house of Austria. In 1663 he was sent as ambassador to James VI. on his succession. Honours and emoluments flowed in upon him. Towards the end of his life, he had an annual income of 24,000 livres; his office of counselor of state was much; he held several governments, the appointment of a counselor of Navarre, the command of a troop, to all of which considerable pensions were attached, and he retained them till the time of his death. In 1665 he was created Duke de Sully and a peer of France. And his advice was taken and his services employed by the king in his most delicate family arrangements, as well as in the state.

The murder of Henri IV. in 1610 terminated the career of Sully as minister. He stood alone after the death of him to whom alone he had devoted himself; obnoxious to envy and intrigue on account of his power and wealth, doubly obnoxious as a Protestant. He continued for some time to attend the council as usual, but finding himself systematically thwarted by the favourites of the new court, he made preparations for resigning in the commencement of 1611, and early in that year formally gave up the offices of superintendent of the finances, and counselor of the king.

From that time the château of Villebon became his principal residence. In the spring and autumn of every year he visited Sully and Rosny. He had retained his government of Poitou, and the direction of the artillery, the fortifications, and the roads and bridges; so, though retired from court, his life was neither private nor inactive. He attended at least one council of the Protestants; but refused to take part in any of their armaments. He retained the residence and was apponted to the office of chancellor by Louis XIII., in 1653. The favourite amusement of his declining years consisted in preparing his Memoirs 'of the great and royal economies of Henri IV.' for publication. He took a keen interest in the management of his estates. Thence, especially in his latter days, he retired to him in some disagreeable embarrassments; and the decision against him of a suit which his grandchild had been instigated to commence is supposed to have hastened his death. He died at Villebon, December 22, 1641.

Sully was essentially a man of action; except for history, and those branches of knowledge which are useful to the soldier and practical statesman, he seems to have had little literary taste. He was fearless, enterprising, and perceiving; but his appearances were not inordinate, and were held in no small respect by his powers of speech and of the chief and just perception of character. He had naturally a love of order and dispatch, which were strengthened by habit. His theoretical views of society and political economy do not appear to have been extensive; and the strange and cumbersome arrangement of his Memoirs would seem to indicate that he was labour under the same inability to tell a plain story briefly, and intelligibly, which has been observed in others eminent for the clearness of apprehension displayed in their actions. His moral creed seems to have closely resembled that of the contemporary Puritans of England. It is more difficult to conjecture what were his religious opinions. With great temptations to abjure the Protestant faith, he continued to profess it to the last. Yet he advised Henri IV. to recant and return to the Church of Rome, and the abjuration of that king is beyond a doubt. Nor can his adherents to Protestantism be explained upon the assumption that he was influenced by a partisan point of honour; for he was a Frenchman than a Protestant, and invariably sacrificed the party interests of the Huguenots to the broad interests of the nation. He belonged to Henri IV. without a tinge of superstition; it was long affected by the predictions of astrologers, if it was ever entirely cleared of them. His love of state, and display in his apparel, household, and attendants, is another indication of something immanently French. It was a great retainer of his, Jean de Rosny, who was secretary to the king; he was always present during the meals, which that weakness frequently led his master. Sully was not exactly a person to be loved, but he was one to be revered and implicitly trusted. He was perhaps a servant such as no king but Henri IV. ever had; as Henri IV. was already tuned to the admiration of himself, of which the king was completely deprived; a few remains of a temple of his was a part of the joins which were added to his purse. That a servant beyond any king who ever existed. The administration of Sully is an important chapter in the history of France: the subsequent fortunes of that nation cannot be thoroughly understood unless by one who has studied attentively (The principal authority for the facts stated in this sketch is Sully's own work; but some assistance has been derived from De Thou and other contemporary writers.)

SULLY, HENRY. [HUSBAND.]

SULMO'N'A. For the city of Naples, in the province of Abbruzzo Ultra II., is the chief town of one of the four districts into which that province is divided. It lies in a deep valley drained by the Sagittario, an affluent of the Po. It is surrounded by the town of Sulmona, having the central ridge of the Apennines on the west, and the lofty group of Majellet, an offset of the Apennines, on the east. This valley forms an important pass between the central and northern provinces of the kingdom, leading from the valley of the Marecchia to that of the Onde, whence the road is continued to the valley of the Volturno by Isernia. The ancient Sulmo, Ovid's birth-place, which was at some distance from the site of the modern Sulmona, has been completely destroyed; a few remains of a temple of the temple of Hercules, and a little from Sulmona. The modern town, which is walled, looks old and gloomy, like most towns of Abruzzo.

It is a bishop's see. It has about 8000 inhabitants, a college, a clerical seminary, some paper-mills, and manufactories of esparto, sugar-plums, and esparto; much wine is made in the neighbourhood, as well as oil, and corn is reaped in considerable quantity. The valley of Sulmona is intersected by several streams, and irrigated by artificial canals. Ovid, in several places of his 'Aristotelica,' seems to mind the copious and cool streams of his native country.

Some of the churches of Sulmona are worthy of notice: in that of La Badia is the tomb of Giacomo Caldara, a celebrated contrabassist in the fourteenth century, who died singularly young and totally distracted by the clock, supporting the claims of King René of Anjou against Alphonse of Aragon. The latter, having taken Sulmona, is said to have forgiven the town for the sake of its native poet Ovid. Near Sulmona is the splendid monastery of S. Spirito di Monre, belonging formerly to the wealthy order of Celestines, now suppressed. In the town above the barrack gate there is a piece of wretched sculpture, which the inhabitants are pleased to style a statue of their townsman Ovid, of whom they seem very proud.

Sulmona was the capital of the town of the Peligni, a people of Sabine origin, like their neighbours the Marsi, with whom they were allied. Corfinium, another town of the Peligni, was in the same valley, a few miles north of Sulmona, and the road leads from the ancient canal in the rock are still visible. (Ara di Ronco, Corfinio, sul mar della Sabina.) The Peligni, having joined the Marsi and Sammites against Rome, were defeated by the consul M. Fabius, 443 B.C. Four years afterwards, the Peligni, together with the Marsi, Frenati, and Marcellus, sold themselves to Rome and paid one thousand talents, which was granted, (Livy, ix, 45, 49.) During the second Punic war we find a body of Peligni, under its pretector Vebius Aquicuss, fighting bravely as auxiliaries of the Romans against the Carthaginian commander Hannibal, near Bene-ventum (A.D. 207). The Peligni, were foremost in the confederacy which rebelled on the Peace of Antium,
and their town Corfinium, under the name of Italica, was made the capital of the league. They were however defeated by the legate Servius Sulpicius (Epitoma, 73), and they made their submission, together with the Vestini, to the procurator Cn. Pompeius.

SULFARI CHAPIPELAGO. [Sululo Archipelago]

SULPHATES and SULPHITES. [Sulphur]

SULPHOCYANIC ACID and SULPHOCYANEGN. [Sulphur]

SULPHONAPHTHALIC ACID and SULPHONAPHTHALIN. [Sulphur]

SULPHOVINIC ACID. [Sulphur]

SULPHUR, commonly called brimstone, is a solid ele-
ment, white in appearance, which is well known from the remotest antiquity. It is met with pure and in various states of combination; thus it is found combined with numerous metals and in immense quantity, as with iron, forming the yellow-brown, metallic ore, called pyrites, with copper, lead, antimony, &c., constituting the principal ores of vaseline, as well as largely combined with oxygen, forming sulphuric acid, which is generally united with an earthy base, as with lime, constituting sulphate of lime, or gypsum, and with barites, antricipate granites; near Innsbruck in Hungary, in more solid bases. It occurs also, but in smaller quantity, and principally in mineral waters, such as those of Harrogate, combined with hydrogen, the result of combination being sulphuric hydrogen gas, or hydro sulphuric acid. Sulphur is a constituent of urine, and when that fluid is boiled with copper, lead, antimony, &c., it is found also in certain plants; in Liliaceae, as in garlic, Cruciferae, as in mustard, and Umbelliferae, as in Aneth. Nnre- Sulphur.—This occurs massive and crystallised. By boiling with water the crystal right rhombic prism, the usual form being the secondary one of an acute octahedron with a rhombic base. Cleavage parallel to the lateral faces of the primary form. Fracture conchoidal. Hardness sufficient to scratch sulphate of lime, but is scratched by carbide of calcium. It is volatile, being negatively electrically by friction. Colour various shades of yellow, sometimes greenish, and reddish. Streak pale. Lustre resinous and shining. Odour slight, unless heated or rubbed. Transparent; tenacious; opaque. Refraction double. Specific gravity 2:072.

Massive Varieties.—Amorphous, structure crystalline, granular, compact, stelactite structure compact.

Sulphur is found in veins and beds. In Suabia in veins traversing iron and lead; in anatase, near Innsbruck, in more solid base; and at Bex in Switzerland, in limestone and gypsum of the salt deposit; and in this kind of deposit it occurs most abundantly, generally in beds, or disseminated in large masses.

Sulphur is procured sometimes by the decomposition of iron pyrites, or bisulphate of iron.

Volcanic Sulphur.—The most remarkable deposit is that of Solfatara near Naples, whence an immense quantity is imported into this country. It occurs also in the fissures of volcanoes, as in the Mount of Corfu, the Cévennes of France, especially in Guadaloupe, Nevis, and the volcanoes of the Cordilleras.

Sulphur is purified in this country, and has different forms given to it according to circumstances; what is called re- fined sulphur is purified by distillation in a large cast-iron still, and it is condenséd in an iron receiver kept cool by water. When melted and cast into wooden moulds, it is called roll or stick sulphur; and when the vaporised sulphur is condensed in a large chamber, it has the form of powder, and is called sublimed sulphur, or flowers of sulphur.

We shall now describe such of the physical and chemical properties of sulphur as have not been mentioned under Native Sulphur. Sulphur is insoluble in water, but dissolves in much acid, and in aqueous solutions of bases. Sulphur is also heavy in the atmosphere; it is soluble in water, and is deposited by evaporation of water. Sulphur is precipitated by boiling oil of turpentine; the solution has a reddish brown colour, and, on cooling, minute crystals of sulphur are deposited.

Sulphur is a very volatile body; it is very volatile, and when it is rubbed in the dark on a brus, on any other substance by which it is heated, though not sufficiently to inflame it, an extremely weak blue flame arises, exhaling a peculiar colour: this flame is not however occasioned by combustion, but by oxidation. The alkali carbonates and carbonates of ammonia give off a cold body held over it is covered with flowers of sulphur. When sulphur is heated, it begins to vapo-

ize before it fuses: at 550° to 600° it is rapidly volatilised, and in close vessels is condensed without change. The specific gravity of the vapour of sulphur is about 6 84. Some metals when heated in it burn very. The fusibility of sulphur is 232°, and between this and 280° it possessed the highest degree of fluidity: at 330° it begins to thicken, and at 482° is so tenacious, that it will not flow from an inverted vessel: from this to 600°, it again becomes fluid, but not so readily as before, in 750° of boiling in closed vessels, an orange coloured vapour is formed. When poured into a water in a fluid state, at about the temperature of 62°, it becomes a brown paste mass, which readily receives and retains any form given to it, and hence it is employed in taking casts. Sulphur is what is called a dimorphous body; that is, it crystallizes in two different and incompatible forms. It has been already stated that the primary form of native sulphur is a right rhombic prism, whilst that of sulphur artificially crystallised by fusion and cooling is an oblique rhombic prism.

Oxygen and Sulphur form several compounds, but there is no mere oxide of sulphur, all the compounds of these elements being primary or the first compound of them which we shall describe is—

**Sulphurous Acid.**—It is to be observed that oxygen and sulphur do not combine at the usual temperature of the air; but when sulphur is heated in the air to a little above 309°, it takes fire with a pale blue flame, and combines with oxygen to form the oxide of sulphur. The composition of this oxide is not well known, but it is a compound of sulphur and oxygen, and it is capable of combining with air, and as the composition of the atmosphere is about 100 parts by volume of sulphur dioxide, and the oxygen of 86 parts, it is evident that the composition of the atmosphere is such as to effect a union of sulphur and oxygen, and sulphuric acid is formed, which is a compound of the elements sulphur and oxygen.

**Sulphuric Acid.**—This has a very pungent and suffocating odour, being a colourless gas, has a temperature of 90°, and a pressure of 250°; the composition of the atmosphere is such as to effect a union of sulphur and oxygen, and sulphuric acid is formed, which is a compound of the elements sulphur and oxygen.

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SUL. 260

SUL.

sufficient importance to require description: by exposure to
the air they all become sulphates.

Sulphuric Acid. This acid has been long known, and
is very extensively employed. When combined with water,
in which it is a liquid, it is very inflammable, and is
still frequently called oil of vitriol: first, because it is
an oleaginous liquid; and secondly, on account of its being
obtained from green vitriol, or copperas, now called sul-
phate of iron.

The process is still followed at Nordhausen in Germany,
and the peculiar compound of sulphuric acid and water pro-
duced by it is called Nordhausen oil of vitriol, to distinguish
it from common oil of vitriol, a different compound as regards
the water which they contain, and obtained by a different
process. We shall first describe the original process and
product.

Iron pyrites is a well known and very abundant natural
substance: it is correctly termed bimetallic iron, and consists
of two equivalents of sulphur 32: the first equivalent
of iron. When certain varieties of this compound are
exposed to air and moisture, both the sulphur and iron are
oxidized at the expense of the oxygen of the air, and though
sulphur by itself is incapable of undergoing this change,
yet, when combined with iron, it acquires from the air suffi-
cient oxygen to become sulphuric acid, and the iron attracts
enough to become protioxide; and these combining, toget-
er, and with water, constitute the well-known crystalline body,
hydrated sulphate of iron, usually called, for brevity's sake,
the common or red vitriol, and consisting of water, which
consists of one equivalent of sulphuric acid, one of prototive
acid of iron, and seven equivalents of water. Sulphuric acid
consists of three equivalents of oxygen 24 + 16, one equiva-
 lent of iron, and in proportion to the acid from
this salt is moderately heated, so as to expel the greater
part of the water: in this state it is put into earthen
retorts, and subjected to a very high temperature, during
which there comes over and condenses in the receiver a dark-
coloured dense fluid, which is the Nordhausen oil of vitriol.
The cause of the colour has not been ascertained, but it
appears to be an accidental and not a necessary accompa-
niment: this liquid emits a white vapour when exposed to
the air, and hence it is called fuming sulphuric acid: it is com-
posed of:

Two equivalents of sulphuric acid

One equivalent of water

9 9

Equivalent

Now it happens that anhydrous sulphuric acid is more
volatile than that combined with water, so that when the
above acid is heated in a retort, there first comes over and
condenses in the receiver one equivalent of anhydrous sul-
phuric acid as a red fluid, or an equivalent of hydrat
ed sulphuric acid 40 + 9, one equivalent of water:
=49.

We shall first and briefly state the properties of the anhy-
drous acid. It is a colourless crystalline solid; it is tough
and heavy; melts at 100°, and forms a temperature
between 104° and 122°, forming a transparent vapour, pro-
vided no water is present; it unites with moisture when
exposed to the air, and forms with it dense white fumes. It
is sometimes prepared as a matter of curiosity, but is hardly
applied to any use.

The hydrated sulphuric acid, commonly called oil of
vitriol, or simply sulphuric acid, is the compound which is
so largely employed in numerous chemical operations
and manufactures. It is, however, and has indeed for many
years been a much more important compound than that de-
scribed by the decomposition of sulphate of iron.

An account of the present method of preparing this acid
we shall take, with slight variations, from the last edition
of Dr. Thomas's Chemistry. Sulphur is mixed with triblack,
one-eighth of its weight of nitrate of potash, and the mix-
ture is burned in a furnace so contrived that the current of air
which supports the combustion conducts the gaseous
products into a large leaden chamber, the bottom of which is
covered with sand, and a few inches of water, which
the nitric acid of the nitre, composed of oxygen and azote, is
decomposed, yields oxygen to a portion of the sulphuric acid
formed by combustion, and converts it into sulphuric
acid which combines with the potash of the nitre, and forms
a liquid solution of potash. The latter is raised to the
sulphur forms sulphuric acid, by uniting merely with the
oxygen of the air during combustion. The nitric acid, on
losing oxygen, is converted partly perhaps into nitrous acid,
but chiefly into nitric oxide, which, by mixing with the
air at the moment of its separation, combines with its
oxygen, and gives rise to red nitrous acid vapour. The
gaseous substances thus formed in the leaden chamber are
therefore sulphurous and nitrous acids, atmospheric air, and
watery vapour. Now, when dry sulphuric acid gas and
dry nitrous acid gas are mixed together, no action occurs
between them; but when a little moisture is added, a white
crystalline compound of sulphuric acid, hydrogen peroxide
and water is formed; and when this falls into the water of
the chamber, it is instantly decomposed, the sulphuric
acid is dissolved, and nitrous acid and nitric oxide gases
escape with aftertaste. This is the acid, as well as that produced by the nitric oxide uniting with
the oxygen of the atmosphere, is again intermixed with
sulphuric acid and moisture, and thus gives rise to a
second portion of the crystalline body, which undergoes
the same changes as the first; and thus the process
repeats itself until the water at the bottom of the lead-chamber is suffi-
ciently acid to be removed for ulterior operations.

It thus appears that sulphur during combustion can com-
bine only with sufficient oxygen to become sulphuric acid;
but what is curious is, that sulphuric acid becomes
sulphuric acid by taking oxygen from nitrous acid, the
nitric oxide of which appears nevertheless to have a stronger
affinity for it, since it can take oxygen rapidly from the air,
which sulphuric acid cannot. The first attempt at a
working up of this acid that has come to light was com-
missioned by MM. Clement and Desormes: it was there-
fore subsequently further explained by Davy and other che-
mites.

In some cases we believe that the nitrate of potash, in-
stead of being mixed with the sulphur, and burnt with it,
is decomposed by the addition of sulphuric acid, in the
same mode as that employed for preparing nitric acid. Of
late years also sulphuric acid has been made from iron
pyrites, the sulphurous acid being formed by combus-
tion, and converted into sulphuric by the agency of nitric
acid.

When the sulphuric acid in the chamber has acquired a
density of about 1·6, it is drawn off and further concen-
trated in more lenses, and vessels by heat, and after this has
been removed either to glass or platina retorts, and heated till it
has acquired a density of about 1·835: this is then the sul-
phuric acid, or oil of vitriol, of commerce, composed of:

One equivalent of sulphuric acid

One equivalent of water

9 9

Equivalent

The properties of this acid are, that it is a limpid, in-
ocuous, odourless, colourless liquid, of a density about 1·67,
and distills without change; the boiling-point diminishes with dilution: when the volume of specific gravity 1·78
it boils at 435°, and when 1·65 only at 390°, the concen-
trated acid freezes at 15°, but when it contains two equiva-
 lents of water, it is entirely solid. Exposed to heat, it has a specific
glvy of 1·78, it freezes at 40°.

This acid is intensely caustic and acrid, and readily
decomposes animal and vegetable fibre, and even when
diluted to a very great extent it has an extremely sour taste,
and turns vegetable bluish green: on the other hand, when concentrated, it turns turner-paper of a brownish
colour, as the alkaloids do, but the effect is not permanent,
for it is removed by water. Its affinity for water is very
great, attracting it so readily from the air, that in moist
air the acid easily decomposes to its elements to the extent
by long exposure the quantity is increased. When suddenly mixed
with water, much heat is evolved, and, on cooling, condensa-
tion is found to have taken place, the two fluids occupying
less space than before mixing. The sulphuric acid is mixed in certain proportions with snow, heat is given out, or
cold generated, according to the quantities employed: thus
four parts of acid and one of snow evolve heat, but four of
snow and one of acid occasion cold.

Sulphuric acid is mixed with water in vast number of pur-
puses: thus, on account of its great chemical power, it is
used for the purpose of separating other acids from bases,
as in preparing nitric, hydroulric, steric, phosphoric, and
 carbonate acids, &c. It is used in preparing sulphates, a
very common class of chemical products.

The salts which sulphuric acid forms with various bases
are termed sulphates, sesquisulphates, or bisulphates, &c.
according to circumstances: they are a very important class of saline bodies, and those of most use will be found described under their respective bases.

Sulphuric acid in its concentrated state acts in general only slightly, if at all, on the metals; and when they are heated together, the acid is generally decomposed, sulphurous acid and a sulphate of a metallic oxide being produced: thus when copper is heated in concentrated sulphuric acid, the acid yields one of its three equivalents of oxygen to the copper, which, being oxidized, when combined with two equivalents of oxygen is given off in the state of sulphurous acid; and this is one of the best methods of procuring sulphuric acid, it being difficult, if not impossible, as already stated, to saturate oxygen with sulphur by burning the gaseous oxide. When it is boiled with water, sulphuric acid is diluted, it has no action, even when heated, on copper; but on zinc, iron, and such other metals as readily decompose water, it acts with great readiness: the result is that, being oxidized by the oxygen of the decomposed iron, is dissolved by the acid, while the hydrogen of the water is given out in the gaseous state: by this operation, then, we procure a metallic sulphate and hydrogen gas.

Sulphuric acid and all sulphares are decomposed by the salts and in close vessels in an aqueous solution of sul; however acid: solution is effected in this acid without the evolution of any gas, which, however, is frequently stated: a little iron, manganese, or copper, dissolves form crystallizable salts, which, when decomposed by other acids, yield sulphuric acid and sulphur, previously existing in the proportions above stated, and constituting hyposulphurous acid: this acid is also formed when sulphares are dry and in close vessels with sulphur, in which case the sulphur takes half the oxygen of the sulphurous acid; and when iron is dissolved in sulphuric acid, it takes half the oxygen of the sulphuric acid, which, by this loss, becomes hyposulphurous acid, and, combining with the other hydrogen of the hyposulphite of iron, is

The salts containing hyposulphurous acid, or the hypo- sulphites, are not important; and the acid undergoes decomposition when they are strongly heated or acted upon by an acid.

Hyposulphite of soda is employed to distinguish between the salts of barytes and strontia, the former of which precipitates, but not the latter: hyposulphite of lime is also a soluble salt. The existence of a hyposulphite in solution is recognised by its possessing the power of dissolving freshly-precipitated chloride of silver, and forming a sweet compound with it.

Hyposulphuric Acid was discovered in 1819 by Gay-Lussac and Weiter. It is prepared by suspending finely- ground barytes in a solution of sulphuric acid and heating until the solution is in the mixture: this if be kept cold, sulphuric acid is formed; but otherwise the oxide of manganese is dissolved and hyposulphate of its protoxide formed: to the filtered solution sulphuret of barytes is to be added, by the aid of sulphuret of iron, and the mixture is boiled: the sulphate of barytes remains in solution: when the proper quantity of sulphuric acid is added to this, sulphate of barytes is precipitated, and the hyposulphurous acid is liberated, the filtered solution then contains a mixture of unpre- pared sulphuret of sulphur, until it acquires a density of 1.347: if it be carried further than this, it is decomposed into sulphurous acid, which escapes, and sulphuric acid, which remains dissolved.

This acid cannot be obtained free from water: the aqueous solution is sour, inodorous, and reddens vegetable blues: if heated to 212°, it is decomposed into sulphurous acid and sulphuric acids; and when exposed to the air, it slowly absorbs oxygen, and becomes sulphuric acid. Unlike sulphuric acid, it forms soluble compounds with lime, barytes, strontia, and oxide of lead; but, like diluted sulphuric acid, it acts upon the metallic oxides, and with the evolution of hyd- rogen gas, and a solution of hyposulphate of zinc is formed: its salts are decomposed at a high temperature, yielding sulphuric acid and sulphares remaining.

It is composed of—

| Two equivalents of oxygen | 16 |
| Two equivalents of sulphur | 32 |

Equivalent | 48

This acid is procured by dissolving zinc or iron in close vessels in an aqueous solution of sulphuric acid: solution is effected in this acid without the evolution of any gas, which, however, is frequently stated. A little iron, manganese, or copper, dissolves form crystallizable salts, which, when decomposed by other acids, yield sulphuric acid and sulphur, previously existing in the proportions above stated, and constituting hyposulphurous acid: this acid is also formed when sulphares are dry and in close vessels with sulphur, in which case the sulphur takes half the oxygen of the sulphurous acid; and when iron is dissolved in sulphuric acid, it takes half the oxygen of the sulphuric acid, which, by this loss, becomes hyposulphurous acid, and, combining with the other hydrogen of the hyposulphite of iron, is

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It is composed of—

| Two equivalents of oxygen | 16 |
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Equivalent | 48

Or it may be regarded as consisting of 100 cubic inches of hydrogen gas, holding 100 cubic inches of oxygen in combination, the gas, by combining with the sulphur, undergoing no alteration of colour. It reddens moist litmus-paper, but not strongly, and is soluble in about one-third of its bulk of water. At a temperature of 50°, and a pressure of about 17 atmospheres, it is rendered a limpid liquid of specific gravity about 0.9; this does not congeal when cooled down to 0. It is extremely poisonous to animals: air containing 1-150th of its bulk immediately killed a bird, and 1-100th a middle-sized dog. When mixed and detoated with oxygen gas, the results are water and sulphuric acid.

The aqueous solution of hydrosulphurous acid is employed as a test of metals, and, more especially, it is an excellent test for the detection of minute portions of iron, with which it gives a dark-coloured precipitate of sulphuret of lead: with the salts of antimony it gives an orange precipitate, and with arsenious acid a yellow one.

Hydrosulphurous acid forms salts which are termed hydro- sulphates, and these are formed when it is combined with ammonia, potash, soda, and the alkaline earths; but by metallic oxides, properly so called, it is decomposed, the results not being hydrosulphates of metallic oxides, but water and a metallic sulphuret: this is the case with oxide of lead, silver, &c.

Bi-sulphuret of Hydrogen.—This compound cannot be formed by direct combination. To prepare it, equal weights of sulphur and recently slacked lime may be boiled in three hours, its weight for half an hour. The result is a deep reddish-yellow coloured solution of persulphuret of calcium: when clear and cold, it is to be added to an excess

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The text continues with various chemical reactions and properties of the substances discussed. The content covers the processing and properties of sulphuric acid, its interactions with metals and gases, and the formation of various compounds such as hyposulphurous acid and hydrosulphurous acid.
of hydrochloric acid diluted with about twice its weight of water; by their mutual action sulphur is precipitated, accompaned with a yellow oil-like fluid, which is the bisulphuret of hydrogen. Its properties are, that it is a viscid liquid, of a yellow colour, and of specific gravity about 1.77; it smells similar to, but not so powerful as that of hydro-sulphuric acid; its elements are held together by a feeble affinity, so that even in the cold it is gradually converted into hydrosulphuric acid and sulphur, and this change is immediately produced at 212°.

It is composed of—

One equivalent of hydrogen 1
Two equivalents of sulphur 32

Equivalent 33

Chlorine and sulphur appear to form two compounds, the chloride and di-chloride. According to Dumas, when sulphur is acted upon by excess of chlorine, a neutral chloride is obtained, which consists of—

One equivalent of chlorine 36
One equivalent of sulphur 32

Equivalent 68

It usually contains some di-chloride, from which it is to be purified by repeated distillation at about 140° Fahrenheit. It may be prepared either by burning sulphur in excess of dry chlorine gas, or, at common temperatures, by passing excess of chlorine through a tube containing powdered sulphur.

The properties of this chloride are, that it is liquid, has a yellow-brown tint, and a density of 1.62; that of its vapour being about 3.7. Its boiling-point is 147°.

Di-chloride of Sulphur.—This substance was first obtained by Dr. Thomson. When chlorine gas is passed over powdered winter sulphur, gently heated, it gradually disappears, and the di-chloride is formed by direct combination: the liquid obtained is to be distilled, and then possesses the following properties:—It is liquid, and is red by reflected, and yellowish-green by transmitted light; it emits acrid fumes when exposed to the air; its density is 1.687; that of its vapour being 4.7; it is volatile below 200°, and boils at 280°. Dry litmus-paper is not altered by it. It is energetically decomposed by and decomposes water, the results being hydrochloric and hypochlorous acids. It does not combine with alkalies.

It consists of—

One equivalent of chlorine 36
Two equivalents of sulphur 32

Equivalent 68

Sulphur and Bromine. [Bromine.] Having described the principal compounds which sulphur forms with the elementary gaseous bodies, we shall briefly notice those which it yokes by combination with the non-metallic elementary bodies, and first—

Carbon and Sulphur.—These form by direct action sulphuret of carbon, or rather bi-sulphuret.

It may be obtained either by passing the vapour of sulphur over charcoal heated to redness in a porcelain tube, or distilling a mixture of bisulphuret of iron and one-sixth of its weight of charcoal. It may be condensed by being passed into cold water, and to free it from uncombined sulphur and moisture it should be rectified from chlorides of calcium at a low temperature.

Its properties are, that it is a colourless transparent liquid, of density 1.272, that of its vapour being 2.685; it has an acrid pungent taste, and a very keen colour; its retractive power is very high; it is insoluble in water, but dissolves well in alcohol and ether, from which water precipitates it; it is extremely volatile, boils at about 110°, and is not rendered solid at 40°: owing to its great volatility, it produces sufficient cold under the exhausted receiver of the air-pump to freeze mercury: it is extremely inflammable, that in the combustion being carbonic and sulphurous and gases, attended with a brilliant greenish-white flame.

It is composed of—

One equivalent of carbon 6
Two equivalents of sulphur 32

Equivalent 38

It is a remarkable circumstance that so volatile a liquid should be produced by the combination of two solid bodies. It was discovered by Lampadius in 1796.

Phosphorus and Sulphur. [Phosphorus.] Iodine and Sulphur. [Iodine.]

Selenium and Sulphur.—[Selenium.]

Boron and Sulphur form sulphuret of boron.

According to Berzelius, when boron is heated to whitness in the vapour of sulphur combustion takes place, with a red flame, and these substances appear to combine in more than one proportion, but their properties have been very imperfectly ascertained.

Sulphur combines also with various compound bodies to form very different substances: some of these we shall briefly notice.

Sulphur and Cyanogen, when made to unite by heating a mixture of sulphur and bicyanide of mercury, and by some less direct processes, produce sulphaoygenogen, or equivalents of sulphur, a poisonous powder, insoluble in water, alcohol, and miter, but dissolves in hot sulphuric acid, from which water precipitates it; concentrated nitric acid decomposes it.

It appears to be composed of—

Two equivalents of sulphur 32
One equivalent of cyanogen 26

Equivalent 58

Sulphoxyanil Acid; Hydrosulphoxyanil Acid; Sulphoxycyanid Acid; Two compounds were obtained by Faraday from the action of sulphuric acid upon naphthilin; the operation is tedious. Its properties are, that it is crystalline, readily soluble in water and in alcohol; when strongly heated, it is decomposed, at first with the production of naphthalin, sulphurous acid, and charcoal; it reddens moistened litmus-paper powerfully, and has an acrid bitter taste; it combines readily with alkalis, forming salts which are called sulphaoxyanilates; these are soluble in water, and most of them in alcohol, and when heated in the air, they burn, leaving sulphurous, according to circumstances; it is probably a direct compound of sulphuric acid and naphthilin. Its elementary composition is stated to be—

Two equivalents of carbon 120
Eight equivalents of hydrogen 8
Two equivalents of sulphuric acid 80

Equivalent 800

Sulphonic Acid.—An acid produced by the action of sulphuric acid upon alcohol, and, according to Mr. Hennel, a necessary intermediate substance in the formation of sulfa'. He found that when two equivalents of sulphuric acid and two of alcohol were merely mixed, the acid immediately lost four-sevenths of its power of precipitating oxide of lead, and, undergoing great change of properties was converted into the acid in question, and composed of—

Two equivalents of sulphuric acid 80
Two equivalents of alcohol 48

Equivalent 126

When an equivalent of this acid is heated, it is decomposed: the two equivalents of sulphuric acid, and one equivalent lost. A return, while the other elements form an equivalent of methyl-sulphonic acid.

Sulphonic acid may be procured in solution by accurately decomposing sulphovanilin of lead with dilute sulphuric acid; but it has not been obtained in a dry state, except when combined with a base.

Several of the sulphovinates are crystallisable salts, but they are not applied to any particular use.

Sulphur Salts.—These are certain double sulphurates, so designated by Berzelius: the electro-negative sulphurates, constituting sulphuric acid, and the electro-positive sulphurates.
SULPHUR is an elementary principle which occurs in great abundance in the mineral, sparingly in the vegetable, and still more sparingly in the animal kingdom. In the vicinity of volcanoes sulphurous fumes issue copiously from the ground, and many mineral waters owe their peculiar odours and curative properties to this element. Among plants, which contain it have often an offensive smell, to which most probably it contributes, such as assafoetida, garlic, and mustard [Sinapis], in which it last occurs as an involuntary matter, a portion of which probably attaches to the volatile oil of mustard, the smell of which is stronger and more offensive than that of garlic and assayfoetida combined. In animals it occurs in conjunction with albumen, and hence white of egg blackens silver egg-plates.

For medical purposes, it should be as pure as possible, but in the two forms in which it occurs it is seldom perfectly free from admixture. Sublimed sulphur (flowers of sulphur) generally contains some sulphuric acid, which renders it comparatively unstable, but in the precipitated sulphur, mostly contains sulphate of lime. Of the two forms, precipitated sulphur, owing to the extremely fine state of subdivision in which it exists, is in equal quantities more powerful than the sublimed.

Sulphur is both volatile and soluble in oils, both fixed, such as linseed, and volatile, such as turpentine; with the former of which it forms the balsamum sulphuris simplex, with the latter the balsamum sulphuris terebinthinae.

Though devoid of any marked sensible qualities, sulphur acts as a stimulant to the living tissues. Applied to the sound skin, it seems to have no effect upon it, but placed in contact with an ulcerated surface, it irritates and excites an inflammatory action. Large doses, such as a pound, given to horses, prove fatal by causing an inflammation of the lungs, resulting in death by the symptoms, and after death by the mortal appearances. These may not have been due entirely to the sulphur, but to the sesqui-sulphuret of arsenic (orpiment) with which sulphur is often contaminated. Hence the increased redness and sensibility of parts affected with cutaneous eruptions when sulphur is applied to them. It is clear therefore that it is by exciting new action the unhealthy structures that it effects a cure of those diseases, whether particular to the skin, or general to other parts. It may be applied to some other quarter, though this not unfrequently follows the too rapid healing of such complaints, if they have been spread over a large surface. Taken internally, sulphur gives rise to two distinct orders of effect: one, its action on the alimentary canal upon which it generally operates. Small doses, if they do not increase the digestive power, at least do not disturb it; but larger cause a disagreeable sensation in the epigastric region, followed by atonic dejections, which are generally gentle, and without colic or griping. When it causes alvine evacuations, it does not produce marked general effects; but when given in small doses, with a sufficient interval between each to favour its absorption, its general action is commonly very apparent. The pulse becomes more frequent, the general heat and perspiration increase, and the presence of sulphur may be recognised in all the excretions of the body, or a transmutation of it in the form of hydrosulphuric acid (sulphuretted hydrogen). In this way silver worn in the pocket of a person using sulphur becomes black.

The long-continued use of it gives rise to still more obvious stimulant effects. General excitement of the system takes place, increased arterial action leads to hemorrhages, &c., accompanied by restlessness, sleeplessness, and thirst. The breath was nearly burnt and acrid, the perspiration of the skin was profuse, and it is the property of suspending its further use till they can be removed by antiphlogistic means.

Sulphur should not be used for very plethoric individuals, or those inclined to high vascular action, till those states have been lessened by diet and other means.

Internally sulphur has been given in chronic catarrhs and humid coughs, as well as in some of the forms of asthma. In these there are some of the numerous combinations with oils and other substances, called balsams of sulphur, were chiefly used. From the power which sulphur undoubtedly possesses over morous ailments, especially the bronchial, they were often serviceable; but in the asthmatic affections complicated with organic disease of the heart or great vessels, nothing can be more hurtful.

In chronic rheumatism sulphur, from its diaphoretic properties, is of much use when given alone or with antimony. In those forms of dysentery which may be regarded as rheumatism of the intestines, sulphur is perhaps the best aperient in combination with perecuanha. It is also beneficial in those forms of paralysis which have resulted from such a cause. Its employment, especially in cases of ulcers, and considering its power of rousing the vascular system, and its subsequent diaphoretic action, it may be used in those cases where arsenic fails and quinine is too expensive.

Sulphur is given as a laxative in hemmorhoids, stricture of the rectum, and habitual constipation. For these cases it is usually combined with bitartrate of potash, or magnesia, or electuary of senna. A small quantity of the compound cinnamon-powder, or aromatic confection, is a valuable adjuvant to it, as it lessens the tendency to gripping, and also restrains the disposition to the disengagement of sulphuretted hydrogen gas, which is often a distressing consequence of the use of sulphur. The dose varies much in different individuals, but it should never be given in such an amount as an incipient quantity is most prone to generate flatus. Perhaps of a sedentary habit, afflicted with constipation, this combination of unspeakable service, as, unlike many others, it is not followed by greater constipation than before, but keeps the bowels moderately open for a considerable time. It is one of the most approve medicines for children or pregnant females.

Sulphur is generally given internally at the same time that it is used externally for the cure of cutaneous diseases. For one of these purposes it is regarded as almost a general remedy. Sulphur ointment is the form generally employed for this disease. It should never be applied to more than a fourth part of the body at one time. The compound sulphur ointment is more powerful, but requires still more caution in its employment from the danger of burning. In practice, the preferable mode of employing sulphur is by uniting it with soft-soap, which not only does not stain and grease the clothes, but assists in cleansing them as well as the patients, when washed. Besides, the potash of the soap and the curet may be regarded as readily cured by a condensation of sulphur with potash than by either singly. This combination, called Potassium sulphuretum, or liver of sulphur, may be applied in various forms, forming from it a more fluid, or a less fluid, or even a hard water. The natural waters of Harrowgate, Moffat, and other sulphurous springs, owe their peculiarities to it.

Sulphur in combination with iodine, forming ioduret of sulphur, when made into an ointment with a large quantity of vaseline or cerate, is a valuable agent in some cutaneous diseases.

Sulphur in a state of combustion evolves sulphurous acid gas. This is sometimes employed as a fumigation in some obstinate cutaneous affections, especially poroticus inverterata, which often continues about the joints, especially the elbow, when it has been cured in every other part. The employment of this requires caution, and on no account must the face be exposed to it, as it is irritable.

SULPHUR TRADING. Although sulphur exists in Iceland, Teneriffe, St. Vincent's, and some other places, the expense of obtaining it is so great, that Sicily alone has furnished the supply required. The average consumption of England in the five years, from 1830 to 1834, was 7,090 tons. In 1835 the duty was reduced from 15d. to 10d. a ton, and in the following ten years the annual consumption averaged 15,140 tons; and during the last four years of this period the average was 32,000 tons. In 1837 it amounted to 37,486 tons. The consumption of Sicilian sulphur in France, in the first five years of the 18th century, averaged 11,844 tons, increased 37 per cent. during the next five years to 1838, averaging 18,625 tons. In 1840 the importation into France reached 40,618 tons, and the stock in bond amounted to 221,017 tons. In 1842 the quantity in bond in the United Kingdom was 20,319 tons; so that in both countries the importation had greatly exceeded the wants of the home market. From 1833 to 1835 England took 49 per cent. of the whole quantity of sulphur exported from Sicily, and France 43 per cent., leaving only 8
The Sicilian sulphur-mines are the property of individuals, and from fifteen to twenty English firms settled in Sicily are engaged in the trade. In 1836 M. Taix, a Frenchman, laid before the Sicilian government a project for establishing a company which was to have the exclusive right during ten years of purchasing Sicilian sulphur at fixed prices, on condition that the monopoly be maintained for a certain number of years, and exporting one-third of the quantity produced in Sicilian vessels. The British merchants becoming alarmed, the Sicilian government, in reply to the British ambassador, stated that no such proposal could be admissible. It would have been in the highest degree contravention to certain commercial treaties between the two governments. The Sicilian government did however enter into a contract with M. Taix, and on the 4th of July, 1838, notice was given at Palermo that the monopoly would come into operation on the 1st of August ensuing. The negotiations respecting this monopoly were conducted with great secrecy, and it came into operation so suddenly that twenty-four vessels lost their cargoes. The British lessors of mines, and all others, were compelled to produce only a fixed quantity of sulphur; prices rose from 6l. 10s. to 1l. to 13l. and 14l. per ton, and contracts could not be completed. Previous to the monopoly 484 British vessels sailed from the ports of Sicily to the United Kingdom; but in the first year only the monopoly's number was 157. The importation of sulphur, which was 4,653 tons in 1838, was only 22,160 tons in the year ending 10th October, 1839, of which only 5,400 were brought direct from Sicily. A cargo was brought from Iceland. At length the British government decided simultaneously to a monopoly established in the face of commercial treaties: the coasts of Sicily and Naples were blockaded by our ships of war; and the Sicilian government, no longer daring to uphold the monopoly, secured the majesty of the French in adjusting the dispute with the British government.

The monopoly was abolished in July, 1840, and a mixed English and Sicilian commission was appointed in November to investigate the claims of British subjects who had been injured by it. The claims amounted to 65,616£, of which 21,507£ were awarded; and as it was stipulated that the awards should bear interest at the rate of six per cent. so long as they remained unsettled, the Sicilian government agreed, in January, 1842, to pay them without any delay. The sulphur trade is now placed on the same footing as before the 4th of July, 1838.

(Sulphur Trade of Sicily; Journal of Statistical Society, vol. ii., part 6; Papers relative to the Sulphur Question, prepared by Commons Committee, 1842.)

SULPHURIC ACID, MEDICAL PROPERTIES OF. This, which is regarded as the most potent of the mineral acids, is never taken internally in a concentrated state except by accident or intention to cause death or maiming. In such cases it acts as a violent corrosive poison, causing complete disorganization of the tissues it comes in contact with, its course being obvious from the black and charred state of the parts. This effect it is thought to produce from its strong affinity for water, depurating the tissues of its elements, and leaving the carbon free. This peculiarity distinguishes poisoning by it from the other mineral acids. Notwithstanding the extensive destruction of important organs of death, immediate death rarely results from it, but the patient lingers sometimes for days, and in some cases ultimately recovers.

Sulphuric acid is sometimes employed in an undiluted state as a caustic application to the bites of rabid animals, or to destroy warts or portions of the eyelids in entropium and ectropium.

In a considerably diluted state, if it be applied to the skin, it occasions a painful impression, followed by numbness and a contraction of the parts, and even whiteness, owing to the deposit of the highly charged albumen of blood to the part recurs, and soon increases, so that the motion of the vascular system appears to become more developed than before. As it is presumable that a similar series of phenomena take place when it is diluted for use in the stomach, by bearing these phenomena in mind it is possible to explain its therapeutic influence in many of the cases where it is used.

Taken internally in a diluted but still strong state, it makes a powerful impression on the stomach, followed by an instantaneous sympathetic chill of the whole system: hence its power in checking hemorrhage long before its particles can be received into the circulation and constitute the body by immediate contact with their borders. For the same cause it acts as a useful refrigerant in fevers and other inflammatory diseases when the animal temperature is too high. In many of the transient diseases of the skin attended with much heat and itching, a solution of sulphuric acid is really efficacious. Many of the complaints which at first cause some uneasiness in the stomach, quickly relieves them. It has also been given at a late stage of typhus in some mild dilute, such as barley-water. In combination with cinchona, it is of decided utility in purpura hemorrhagica. It is also used in excess of the usual doses, which sweats which attend hectic fever as the compound infusion of roses. In chronic diarrhoea and dysentery it is also sometimes of service. Hemorrhoidal fluxes are often restrained by its use. In some forms of dyspepsia it is a valuable toric, and may be longer persevered with than any other acid except phosphoric. In calculous diseases with a phosphatic diathesis, it is much to be commended from the length of time it can be used. In such cases it is best given in infusion of chamomile made with cold water. It is employed largely diluted as a gargle in the sore-throat of scald fever. Many cases of cutaneous diseases have been cured by the internal use of sulphuric acid. The aromatic sulphuric acid, called elixir of vitriol, has more tonic properties than any of the simple acids, and is used by galenists in many cases, either in the form of a mixture or as an addition to a more concentrated sulphuric acid; it is with great advantage employed in the treatment of them. Acid is generally used in medicine in the form of the sulphydrate, a white, hard, odorless, soft, and flinty, resembling a grahir of a sand. Acid is used also in a variety of other forms; a sulphate, with a suitable mixture of acid; a sulphite, and a sulphate, in the different cases of the mineral acids.

The unguentum acidum sulphuricum is a most effectual application in obstinate cases of itch. It chars the linen.

SULPHURIC ACID. [Sulphur.] SULPZCIA, a Roman poetess, of whose productions we possess only one Satirical (ad Tibullum, 2, p. 350, &c.) conjectured that they were the work of a Sulpicia who lived in the time of Augustus. For this reason Heyne (ad Tibullum, 2, p. 350, &c.) conjectured that they were the work of a Sulpicia who lived in the time of Augustus. But this opinion too rests on very weak grounds, and we cannot indeed see any sufficient reason for supposing that these letters, notwithstanding their slight peculiarities, were not written by Tibullus himself.

(Compare Bähr, Geschichte der Röm. Literatur, p. 230 and 273.)

P. SULPIZCIUS RUFUS was born in the year B.C. 144, and was ten years older than the orator Hortensius. In the year B.C. 94 he prosecuted C. Norbanus for the conspiracy of magistrates, under the provisions of the Lex Apuleia, a circumstance which brought him into notice. (Cic., Off. ii. 14.) In the following year he was quiescer, and he served the tribuneship the next year, and the consulship during the following years. He was tribuns plebis in the year B.C. 88, and supported the faction of Marius. Cicero heard many of his speeches during his tribunate, and thoroughly studied his style of oratory. Cato, of all the orators that I ever heard, the most dignified, the most masterly in expression, the most tragic: his voice was powerful, sweet, and clear; his gesture and every movement graceful; and yet he seemed as if he were trained for the forum, and not for
Sulpicius, the friend and contemporary of Cicero, was nearly about the same age as Cicero (Brut., 49), and consequently was born about the middle of the second, and early in the first century. Cicero says that his father was not an orator. He began his career as an orator, and might have attained the first place or have been only inferior to Cicero, if he had not disappeared from the world. He wrote a eulogy of himself, and notes on one occasion he applied to Q. Mucius Scaevola the Pontifex for his advice on a question of law, and that Scaevola, perceiving Sulpicius did not understand what he said, reproached him for his presumption in undertaking the conduct of cases which was not necessarily involved in them. This determined him to devote himself to the law. The time at which Sulpicius began his legal studies does not appear. He accompanied Cicero to Rhodes, n.c. 76 (Brut., 41), and it may be inferred from the fact that he was taken into the Sulpieius household that he was not a mere literary inquirer, but a man of real talent, and was likely to become a distinguished lawyer. The Pontifex therefore, when Cicero was victorious at Pharsalia, Caesar made him governor of Achaia, where he was at the time when Cicero addressed him one of his extant letters (Ad Div., iv. 3). During the residence of Sulpicius at Athens, his former colleague Marcellus was assassinated in Piraeus; Sulpicius had him honourably buried in the gymnasion of the Academia, where a marble monument was erected to his memory. The inscription is composed of letters sent by Sulpicius to Cicero in an extant letter, which is characterised by great simplicity. After the death of Caesar he was sent by the senate, with L. Philippus and L. Piso, on a mission to Antony, who was then besieging D. Brutus in Mutina, for the purpose of negotiating with Antony before the senate declared him an enemy to the state. He was then in bad health, and only just lived to reach the camp of Antony, where he died, n.c. 43. Cicero pronounced a eulogy on him, and during his last illness, Sulpicius, who is mentioned by Cicero: his wife's name was Postumia. (Cic., Ad Div., iv. 2.)

The fourth book of Cicero's letters (Ad Diversos) contains his letters to Sulpicius and two letters from Sulpicius to Cicero.

Sulpicius was an accomplished man, as well as a distinguished orator; but as a lawyer, he was in the opinion of Cicero, pre-eminent. His teachers were L. Lucilius Baebius and C. Aquilius Gallus, who attributed his excellence as a lawyer to the philosophical discipline which he had undergone. He observed that others possessed a knowledge of the law, but Sulpicius alone possessed art, as a lawyer. He never had derived from mere knowledge of the law, but he had acquired that dialectic skill, the greatest of all arts, which enabled him to dispel the obscurity that characterised the responses and speeches of other lawyers. 'He distributed the matter of his art into six parts. He first laid down that any oration, however perfect in invention, must contain some finition that was latent, he cleared up what was obscure by correct interpretation; he first ascertained and then separated what was ambiguous; lastly, he had a measure by which to estimate and falsify, and to determine what consequences followed and what did not follow from the premises.' To these requirements and to a profound knowledge of the law he added an acquaintance with letters and an elegant diction. Such a combination of talent seldom appears.

Sulpicius was a voluminous writer. Cicero speaks of his works as being unequalled. We may judge of his style from his letter of consolation to Cicero on the death of his daughter Tullia. (Cic., Ad Div., iv. 5.) He wrote nearly 265 commentaries on the works of De Orat., and a work on the art of speaking. He collected in the time of Pomponius Mius. He probably wrote a commentary on the Twelve Tables: he was also the author of a treatise on the Edict, and a law by Q. Mucius Scaevola on the Pontifex (Gell., iv. 1); of a De Divis., and several books 'De Sacris detestandis' (adoption, probably). There are extant various fragments of his belonging to treatises of which are not known. He is often a particular in the life of Caesar, as Servius, but there is no excerpt from his works in that collection.

It seems a probable conjecture that when Alfenus quotes another person without mentioning a name, his master Servius Sulpieius is meant. (Bunkershoek, Obs. iv. 1.) Servius Sulpieius, Cicero remarks, was only acquainted with the names of those who were known as writers. His most celebrated pupil was Alfenus Varus and Aulus Ocellus: there were also among others, Aulus Tusca, C. Aecius Pacuvius, and Antistius Labeo, the father of a more distinguished son.

Our information about Servius Sulpieius is mainly derived from his friend Cicero, who gives him a high character for integrity. He is said to have written some erotic poems. (Cic. Tusc. i. 141; Phil., v. 2.)

SULPICIUS SEVERUS, a Christian writer belonging to the end of the fourth and the beginning of the fifth century of our era. He is generally supposed to have been born about the year a.d. 366, in Aquitaine, and was afterwards educated for the legal profession, and gained great reputation as an orator; but after the death of his wife, who belonged to a consular family, and died at an early age, Sulpicius withdrew himself entirely from the world, and with a few friends led a retired and monastic life as a presbyter in Aquitaine. He commenced this life about a.d. 399, at the same time that his intimate friend Paulinus adopted the same mode of life, who, in his letters commends Sulpicius for his conduct, and the more, as the father of Sulpicius had disapproved of the son for the sake he had taken. (Paulinus, Epist., v. 1; xi. 5; xiii. 3, &c.) But what Sulpicius thus lost through the anger of his father, was amply made up by the munificent liberality of his father-in-law. Sulpicius made him a soproad, to which he retired for some time, and which was taken by Paulinus; Severus, inspired with such admiration, that Sulpicius, who gradually formed an intimate friendship with him, resolved to become his biographer. Further particulars respecting the life of Sulpicius are not known, except that during his latter years he resided in the bishopric of Aquitaine, as he considered his former habits to have been rather luxurious, for which he meant to stoke by perfect silence. (Gennadius, De Virtus Illustr., 19.) The time of his death is very uncertain: some assign it to 420, others to 423, and others again to 438; but the most probable opinion is that he died about a.d. 410, or soon after.

We possess of Sulpicius Severus four different works:

1. Vita Sanei Martini Tironensis,' which is written in the panegyrical style, and is full of miscellaneous events in the life of his hero. It was however not published till after the

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SUM

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death of Martians, about a.d. 400. The work is preceded
by an epistle • Ad Desiderium Fratrem/ and at the end of
it there are three letters describing the death, burial, and
those virtues of Martinus which were not sufficiently set
2. 'Historia Sacra/ or
forth in the biography itself.
•
Chronica Sacra,* in two books. This is a brief history of
religion from the creation down to the consulship of Stilicho and Aurelian (a.d. 400). The first book and the first
twenty-six chapters of the second treat of the history
of the Jews ; and the remaining portion chiefly contains
accounts of the life of Christ, the persecutions of Nero, the
history of Constantino, and in general of the most important events in the early history of Christianity. Here too,
as in his Life of Martin us, the author shows a great partiality
3. 'Dialogi Trea,' or it should
for what is marvellous.
rather be * Dialogi Duo,' as the second dialogue is only a
part of the first: the principal object of these dialogues is
to describe the merits and virtues of the monks and hermits
of the East. 4. * Epistolae,' the genuineness of some of

which is very doubtful.
Notwithstanding ~the superstitious tone which pervades
all the works of Sulpicius, they have a charm arising from
their purity of diction which scarcely any other writer of
His language is clear and concise, and
this age possesses.
he seems to have taken Sallust as his model in this respect
Some writers have therefore called him the Christian

professor at the newly established Bit$ir-J aad$9UK or
military college, with a very considerable pension* and also
bestowed on him a piece of ground in the immediate environs
of Berlin, where he afterwards built himself a villa and hid
out a botanical garden.
accordingly returned to Prussia
in 1762. where he remained till 1775, wheu he was advised
to travel for the benefit of his health, then greatly impaired.
He visited the south of France. Switzerland, and Lombard?,
of which tour he kept a journal that was pubti&hed shortly
after his death.
On his return to Berlin, his health, winch
bad been considerably improved, again declined.
died
February 25th, 1779.
Great as was the d is t met ion he acquired among his eon*
temporaries in other and far different brandies of knowledge, Sutler's fame now rests chiefly upon his * Allgememe
Theorie der Schonen Kunste,' a cyclopaedia of liieiature
and the fine arts; and, as Herder says of jU one that is in
itself an entire academy.
To the plan itself it may be objected that the alphabetical arrangement, though recommended by its convenience, is not the beet; and that as s
dictionary the work now stands in need of considerable additions and augmentations; nevertheless it is a very remarkable one, not so much on account of the mete literary
industry it displays, as for its unity and consistency, and for
the original and philosophical mind which pervades the
whom, and which stamps it as a well -constructed system of

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ststheties.

Vita Martini* has often been printed. The editio
princeps of his 'Historia Sacra' appeared at Basel, 1556,
8vo. ; it was followed by the editions of Sigouius with a
commentary, Bononiae, 1581, 8vo. ; and of J. Drusius,
collection of his works appeared
Arnhemii, 1607, 8vo.
under the title * Severi Opera emendata et illustrate a V.
Giselino,' Antwerp, 1574, 8vo, and Paris. 1575, fol. The
latter however only contains his 'Vita Martini' and the
'Historia Sacra.' Other editions of all the works of Severus are those by G. Hornius, Lugdun. Bat. 1647, 1654,
1665, 8vo.;by J. Verstius, Berolini, 1668, 12mo., Lipsiae,
1703, 1709, in 8vo. The best edition is that by Hieronymus de Prato, Veronae, 1741 and 1754, 4tou, which however
does not contain the letters. His works are also printed in
the •Bibliotheca Patrum Max.,' Lugdun., vol vi., p. 3*4,
&c„ and in Galland's ' Bibliotheca Patrum,' vot viri., p.

author in 1760,

His

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A

355,

&c

(G. Vossius, De Hutoricis Latinh, p. 209, Sec; Bahr,
Geschichte der Bom. Lit^ 2te abtheil, Die Chrutlich

this

work was announced by

its

did not spacer till 1771-4, for Sulser had
not calculated upon the time it wonM take to render he execution satisfactory to himself as welt as the public. The
second edition, in four large volumes, 8vo., with a supplement containing additions and corrections! was puelafcca
1 792-4 : and in 1 799 -came out an appendix to it, forming a
complete • Index' of all the writers, artists. &c. referred
to
it.
There are also distinct works intended as accompaniments to the 'Altgernerne Theorie:' one by Blenkenburg, entitled 'Literary Additions,' &c, 3 vols.*8vo, !»»»
8; the other * Nachtrage' {supplementary articles), by
Schats and Dyck, 8 vols. 8va, 1792-1868.
Of Suiter's
other writings the principal are: 'Moral Reflections on
the Works of Nature,' Berlin, 1741; and • Pmloaophieal
Pieces,' 1773-86.
( Jorden's Lexicon ; Wolff, Eney, National-lit tereOur.)
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SUM AND DIFFERENCE,

There

no need to define the arithmetical meaning of these terms J a few words
only are necessary to put them
their proper poaition in
is

m

algebra.
When quantities receive their proper algebraical.
Homisehe Theolagie, p. 219, &c)
*
SULTA'N, an Arabic word meaning a despotic rmler, signs, and those signs their interpretations [Sign; Negaor a man who is the arbiter of the life and properly of a set tive, &c], they are said to be added to a quantity when
of men.' It is the usual title of royalty among the Arabs and they are allowed to produce their effect, and subtracted
Turks. From sultan the Italians have made their sMmo, when they are allowed to produce a contrary effect. And
and the Spaniards have their sultan. The lawful wife of a when quantities are pot together so that each produces Hs
simple effect, they are said to be added together; white any
sultan, who has children by him, is called by us a sultana,
parcel which is either withdrawn, or compensated by others
[Pbrsia, p. 476.]
the youngest of a of equal and opposite effects, is said to be subtracted.
SULZRR,
We
family of twenty-five children, was born October 16 th, 1720, are not here discussing principles, but settling terms ; and
at Wintherthvr, in the cant en of Zurich, where his father tt is enough if the notions appended to them are proper
held the office of * Secketmeister,' or registrar of public ac- foundations for clear and good deduction ; and an additional
counts. Losing his parents, both of whom died on the same advantage if common ideas and received phraseology are
day. while he was yet in early youth, it was with difficulty also suited, provided that nothing be assumed from such
that be was enabled to pursue his education for the church, ideas and phraseology to the prejudice of the dependence
according to their wishes, but with little inclination on his of the deduction upon the prescribed definitions.
To form a just idea or the property of any person, we take
own part. In 1736 he was placed at the gymnasium at
Zurich, and immediately on quitting it, three years after- the sums which he owes away from his assets ; that is, we
wards, was ordained and became curate to the pastor of take away, not his debts, but sums out of his assets equal to
Maschwanden. Ill health however soon compelled him to his debts. To say that this is taking away bis debts would
resign bis clerical duties, nor did lie ever re-assume them. not be correct ; for taking away his debts would be merely
now returned to his first and favourite studio* of natural destroying his liabilities, without making his assets answerhistory, mathematics, and philosophy, and after residing able: a person who pays another's debts himself takes them
court of justice which decides a claim against the
about four >ears at Magdeburg as private tutor in the away.
family of a wealthy merchant, received the appointment of assets of any one, annexes or puts on a liability; and thus is
Srofessorof mathematics at the Joscbim*thal gymnasium, in algebra adding : if the decision should be reversed ou
appeal, this liability to pay is removed, and this is in algebra
lerlin, in 1747; and so recommended himself both by his
subtracting. In the phrase 'to gain a K»a/ the word "gain'
ability as a teacher and by his attainments, that in 1750 he
was admitted into the Academy of Sciences. The seme is used in the preceding sense of simple adjunction: if it
year was that of his marriage with an amiable woman, whom were as common to talk of losing a loss, the verb to lose
he had the misfortune to lose in 1 760 ; in consequence of would be used in the senae of to remove or to get rid of; the
which bereavement he quitted Berlin, and made a visit to other form of the word would be less of a bull, for to
his native country, where be recovered his wonted health a loss would be to detach it.
In a third form, the idiom
and spirits, and where he first conceived the plan of his is still plainer; to release [from} a loss would be precisely
8i»eh
great work, the 'Theory of the Fine Arts." He would have the idea of algebra, answering to sub tract ins; a tow*.
Switzerland* and he made application to things we mention, because by some persons those inVas of
gladly remained
that effect, barf iaataad ef Hasenrng to it, the Irtng made a4gefiratoal operation to which oonrmon idioms adapt them

SULTANIYAH.

JOHANN GE0RG,

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SUM 267

selves are easily received, as if the understanding of these common idioms were the same as that of the algebraical proposition; while other operations which have no such common phrases to illustrate them are difficulties.

SUM (in the sense of Integral). Before the organization of the formal integral calculus, the isolated operations of integration which were attained were expressed in words borrowed apparently from the notion of indivisibles. [Ca- valieri.] Thus the title of one of Halley's papers is, An Easy Demonstration of the Analogy of the Logarithmic Tangents to the Meridian Line or Sum of the Secants. Here the sum of the secants means what we should now denote by $\int \sec x \, dx$.

**SUM. SUMMATION.** In the articles Integration, Limits, and Progression, some ideas and rules are given upon the subject of the summation of a finite number of terms of a series; and in Series will be found exam. les of the inverse process of development. In the present article we are to give some account of the methods of actual summation which are in use in the higher branches of mathematics; referring for the demonstrations to the Differential Calculus in the Library of Useful Knowledge (edited by the letters D. C.). We shall dwell upon this a greater length than would appear to be altogether in keeping with the ex- tent of the articles above cited; the reason being that many persons to whom the following rules might be practically useless never hear of them because they are locked up in Treatises on the Differential Calculus, or in works which are not generally read. The usual elements of differen- tiation and integration are enough to enable a beginner to use results, the proof of which must be reserved for a more advanced stage of his progress.

1. When the terms of a series are alternately positive and negative, $a, -a, a, -a, \ldots$, &c., the sum of such a series ad \textit{infini- tum} may thus be expressed [Difference] (D. C., pp. 566-569):

$$a_0 + \Delta a_0 + \Delta^2 a_0 + \Delta^3 a_0 + \ldots$$

which is frequently more convergent than the series itself; in fact, the less convergent the series is, the more convergent is the differentiation. Dr. Hutton's method of obtaining the transformed series is as follows:—Take a number of the successive sums $a_0, a_1, a_2, \ldots$, &c., and let

$$S_0 = 0, \quad S_1 = a_0, \quad S_2 = a_0 + a_1, \quad S_3 = a_0 + a_1 + a_2, \quad \ldots$$

Take the half sum of $S_0$ and $S_1$, the half sum of $S_1$ and $S_2$, the half sum of $S_2$ and $S_3$, &c. Let these be $T_0, T_1, T_2, \ldots$. Repeat the process: take the mean of $T_0$ and $T_1$, that of $T_1$ and $T_2$, &c., until $U_0, U_1, U_2, \ldots$, &c., is reached. Then the set $S_0, T_0, U_0, V_0, \ldots$ will severally approach nearer and nearer to the series required: in fact

$$T_0 = a_0 \cdot U_0 = a_0 - \Delta a_0 + \frac{\Delta^2 a_0}{2} + \frac{\Delta^3 a_0}{4} + \ldots$$

It would however be somewhat easier to proceed as follows:—having formed differences as far as may be thought neces- sary, say up to $\Delta^2 a_0$, take half $\Delta^2 a_0$ from $\Delta^3 a_1$, half the result from $\Delta^4 a_1$, half the result from $\Delta^5 a_1$, and so on until $a_0$ has been used: after which have the result again. In either case we need not begin at the beginning of the series: if it be more convenient to begin after $a_0$ let $A_0 = a_0 - a_1 + a_2 - a_3 + \ldots$, and calculate separately: then calculate $a_0 - a_1 + a_2 - a_3 + \ldots$ from the rule, and we have $A_0$. This is the most general form for the series required. The follow- ing is an instance from Dr. Hutton (Tracts, vol. i. p. 191), the series being $1 + 1 + 1 + \ldots$

Sec. Sum. 1

The result is $0.693147$, which is correct to the sixth place, and is more than could be got from the series itself by actual summation of a million of its terms. Dr. Hutton begins in forming the means with $1 - \frac{1}{2} + \frac{1}{3} + \ldots$, we shall there- fore try the other method, beginning with $1$.

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**SUM.** The several orders of differences:

<table>
<thead>
<tr>
<th>Term number</th>
<th>Order of differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$a_0$</td>
</tr>
<tr>
<td>2</td>
<td>$a_1 = a_0 + \Delta a_0$</td>
</tr>
<tr>
<td>3</td>
<td>$a_2 = a_1 + \Delta a_1 = a_0 + 2\Delta a_0$</td>
</tr>
<tr>
<td>4</td>
<td>$a_3 = a_2 + \Delta a_2 = a_0 + 3\Delta a_0 + \Delta^2 a_0$</td>
</tr>
</tbody>
</table>

This last process will be found on trial the easier of the two.

2. The sum of the series $a_0 - a_1 + a_2 - \ldots$ &c. ad \textit{infini- tum} may thus be expressed (D. C., p. 533):

$$a_0 - a_1 + a_2 - \ldots$$

where $a_0$ is a function of $x$, generates the several terms by

$$\begin{align*}
\frac{a_0}{2} & \quad \frac{a_1}{4} \\
\frac{a_2}{8} & \quad \frac{a_3}{16} \\
\frac{a_4}{32} & \quad \frac{a_5}{64} \\
& \quad \ldots
\end{align*}$$

and the general term is

$$a_n = \frac{a_n}{2^n}.$$
The first line means that the sum of the series is infinite, but that the expression for a large number of terms contains the logarithm of that number, which being removed, the rest of the expression approximates as the number of terms increases, to \(577215.792458469242\).

5. The series \(1 + 2 + \ldots\) is connected with \(1 + 2 + \ldots\) by the following simple law:

\[
1 + 2 + 3 + \ldots = \left(1 + \frac{1}{2}ight)
\]

\[
1 + 2 + 3 + \ldots + n = \frac{n(n + 1)}{2}
\]

6. The sum \(a_1 + a_2 + a_3 + \ldots + a_n\) ad infinitum may be thus transformed:

\[
\sum_{n=1}^{\infty} a_n x^n = \frac{a_1}{1 - x}
\]

where the notation is as previously explained, and \(1 - x = 0\) &c. are the series of Numbers of Bernoulli. To apply this, for example, to \(1 + 2 + 3 + 4 + \ldots\), it will be convenient to begin from some term which will make the series more convergent. Let \(a_n = (10 + x)\); we have then for \(10^{-2} + 10^{-3} + \ldots\) the following:

\[
\frac{1}{10} + \frac{1}{10^2} + \frac{1}{10^3} + \frac{1}{10^4} + \ldots
\]

which may be easily calculated, and the preliminary series \(1 - 2 + 3 - 4 + \ldots\) may then be added.

7. The finite series \(a_0 + a_1 + a_2 + \ldots + a_{n-1}(x\text{ terms})\) is thus transformed (D. C., p. 266):

\[
\sum_{n=0}^{\infty} a_n x^n = \frac{a_0}{1 - x}
\]

when the complete series is divergent, the set of terms \(a_0 + a_1 + \ldots + a_n\) may be thus expressed:

\[
C + \sum_{n=0}^{\infty} a_n x^n = \frac{a_0}{1 - x} + \frac{1}{1 - x}
\]

where \(C\) must be determined by an instance. Thus if we make \(a_n = (1 + x)^{-n}\) we have for \(1 + 2^{-1} + \ldots + x^{-1}\) the following:

\[
C + \log((1 + x) + 1 + 1 + \ldots + x) = \frac{1}{1 + x} + \frac{1}{1 + x^2} + \ldots
\]

Sum of Series:

\[
\frac{1}{1 + x} + \frac{1}{1 + x^2} + \ldots
\]

To determine \(C\), choose such a number for \(x\) as shall make this series convergent, say \(x = 10\). Calculate \(1 - 1 + 1 - 1 + \ldots\) term by term, which is easily done, and equate the sum to

\[
\frac{1}{1 - x} - \frac{1}{1 - x^2} + \frac{1}{1 - x^3} + \ldots
\]

which gives \(C = 577215.792458469242\), the number mentioned at the head of the table for series of inverse powers already given. With the value of \(C\) thus determined, and a sufficient table of logarithms, the larger the number of terms in \(1 - 1 + 1 - 1 + \ldots\), the more easily is its approximate value calculated.

8. The series \(1 + 2 + 3 + \ldots + x\) is of sufficient importance to have an article a term. Make \(a_n = (1 + x^n)\) and proceed as in the last example, which will give for \(1 + 2 + 3 + \ldots x\) the following series:

\[
C + \log(1 + x) + \frac{1}{2} \log(1 + x^2) + \frac{1}{3} \log(1 + x^3) + \ldots
\]

\(C\) might be determined as before, but a particular mode of investigation shows it to be \(log(1/x\), where \(x = 3 + 14159\), as usual. This gives:

\[
1.2345 \ldots x = \sqrt{2} + x^2, \quad 1 + \frac{1}{1 - x^2} + \ldots
\]

a result of the greatest use, particularly in the more complicated applications of the theory of probabilities.

9. The series \((1 + x^2 + x^4 + \ldots + x^n)\) in which \(a_n = x^n\) is being integer and positive, is by the case of \(S\), and adding \(x^n\) to both sides,

\[
C + \frac{x^2 + x^4 + \ldots}{n-1} = \frac{x^n}{1 - x^n} - 1 + \frac{n(n-1)(n-2)}{2(n-3)}
\]

&c.; and this vanishes when \(x = 0\), whence \(C\) must be taken accordingly in every instance. To take an example which shall require a little of the extension of the series beyond the terms used above, let it be required to find \(0.1 + 2 + 3 + \ldots\). Looking at the article Numbers of Bernoulli, we find a supply of coefficients in

\[
\begin{align*}
1 & 1 1 1 5 691 \\
6 & 30 42 30 66 2730
\end{align*}
\]

and the sum required is

\[
C + \frac{a_0}{1 - x} + \frac{1}{1 - x^2} + \ldots
\]

which vanishes when \(x = 0\), whence

\[
C + 1 = \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9}
\]

and the rest may be reduced to

\[
\frac{a_0}{1 - x} + \frac{1}{1 - x^2} + \frac{1}{1 - x^3} + \ldots
\]

or \((3 + 12 + 24 + 48 + 96 + \ldots)

SUMACH. (Rus.)

SUMAROKOV, ALEXANDER PETROVITCH, whose name was, after that of his contemporary and literary rival Lomonosov, almost the only one that, until of late years, was at all known in this country as that of a Russian poet, was born at St. Petersburg in 1714, and was the son of a general officer. He was educated first at home, and afterwards in the Land Cadet Corps, where he soon distinguished himself by his ability. The study of Corneille and Racine inspired him with a taste for dramatic composition, and at about the age of twenty-five he began to attempt it. His tragedies were at first performed at court before the empress Elizabeth, for there was then no public theatre, and as they satisfied the principal person, they were loudly applauded by the rest of the audience. This success encouraged Sumarokov, who was naturally of a vain disposition, and he determined to establish a permanent theatre in the capital; an attempt in which he was greatly aided by the influence of his father (Peter Pankratcovitch), who besides being a person of some consequence in other respects, held a post near the person of the grand-duke Peter. The result was, that the theatre was opened in 1736, under the immediate patronage of the court, and
Sumarokov appointed its director; whence he has been generally considered the founder both of the Russian theatre and the Russian drama. But dramatic entertainments were not totally unknown to his countrymen before his time, for they had been introduced at court at the close of the preceding century, and the sculptural pieces of Demetrius, bishop of Ros托v, had been performed (b. 1651, d. 1709). At the very time too that Sumarokov was organizing his several institutions, money was pouring into Yaroslav, but it was then that he obtained his chief performers, including the celebrated Volkov [Volkov] and Dmitrievsky, who afterwards obtained the appellation of the Russian Garrick.

Sumarokov is generally considered the originator of Russian drama. He was, indeed, the one who first designed and adapted to it the principles of the French stage, and, as respected the form and style of his dramas, Sumarokov was more original in his productions, notwithstanding they are not, like his Demetrius, on the list of acting pieces. As a comic writer, he hardly deserves mention, for his dramas of that class are little more than farces, occasionally coarse in expression, but less gross and less affected than those of Grotius, or as delicate, are tolerated as decent. They have one merit, that of setting the example of prose dialogue as the most suitable for the drama of ordinary life; but their language is now become quite antiquated: a disadvantage more sensible as regards plays for the stage. Sumarokov attempted not only every species of the drama, including operas, but almost every form of poetical composition. He versified the Psalms in ten books, and wrote a vast number of odes, satires, epistles, fables, elegies, odes, sonnets, epigrams, songs, and other pieces, besides several in prose, including some historical and didactic ones, and his Dialogues of the Dead, &c. The first complete edition of his works was published in ten volumes, 8vo, in 1787, ten years after his death, which happened at Moscow, October 1, 1777. If no longer read, Sumarokov is certainly not forgotten, for he is one of those who have earned for themselves a traditional fame in literature that very long survives their works.

(G. Gram. Istoriî, &c.; Otechetst. Zapiski.)

SUMATRA is a large island in the Indian Ocean, and the most western of the Sunda Islands. The equator traverses the island nearly in the middle. Sumatra extends full six degrees to the south of that line, and nearly as much to the north; and the coast line of the island on the south-east is in 95° 20' E. long., and the most eastern part, the coast between Lucepara Point and the First Point at the southern entrance of Banca Strait, is in 108° 6' long. The general direction of the island is nearly north-west and south-east, and its length rather exceeds 986 miles. The width south of 1° N. lat. is on an average 210 miles, but farther north not more than 140 miles. According to a rough estimate, its area is rather more than 160,000 square miles, exceeding by many degrees that of the British Islands. It is one of the three chief islands of the British Archipelago which are likely to become one of the superfine of the British Islands.

The south-west side of Sumatra is bounded by the Indian Ocean; the northern part stretches into the Bay of Bengol; to the north-east it is divided from the Malay Peninsula by the Straits of Malacca. Between the southern extremity of these straits and the island of Bencoolen, it is washed by the China Sea. It is divided from Banca by the Strait of Banca. The coast south of that strait is washed by the Java Sea. The southern extremity is separated from Java by the Straits of Sunda.

Coast.—Sumatra terminates at the southern extremity on the Straits of Sunda in three promontories, including the bays of Lampong and Samangka; the latter is also called Koos-foo's Point by the Chinese. The Tangerang or Tiong Toa, or Hog's Point, Tanjong Kiamatara, and Tanjong Chua. The two first-named capes are formed by rocks of moderate elevation, but the last is the eastern extremity of a low and woody tract which extends about seven miles westward to Flit Point, which is likewise low. The two bays lying between these capes, and containing several good and safe anchorages, are generally surrounded by a low tract, which otherwise rises rapidly at a short distance from these bays, and extends to the extremity of the coast.

The south-western coast from Flit Point to Manna, a distance rather exceeding 150 miles, rises with a steep ascent and generally to a considerable elevation. There are several good harbours, as at Manna and Poofo Bay. There are several suitable harbours, as at Manna and Poofo Bay. The coast is clear of rocks, and there are only a few shoals. The soundings are regular, and extend from 20 to 25 miles from the coast. From Bencoolen to Tapalno Bay, a distance of about 450 miles, the coast-line is alternately low and high, but the cliffs are generally shallow, and not often steep. This part of the coast, especially from Indrapura Point to Tapalno Bay, is formed of a considerable number of islands, most of them rather high, and in many places shoals of various extent occur. Though these islands and shoals render navigation difficult, they protect the coast against the tremendous surf to which the south-west coast of Sumatra is exposed, and make numerous good anchorages. Soundings are found almost everywhere, but in some places they are irregular. Though rather numerous, the headlands do not extend far out to sea. The coast is found in their vicinity, and between them are several good harbours. Tapalno is so large and spacious, and possesses so many advantages, that it is considered as hardly surpassed by any harbour on the globe: Many small islands are dispersed over it, and subdivide it into numerous small harbours or coves, where ships are sheltered from all winds. It is said that all the navies in the world might ride here with perfect security in all weather. The coast continues to be lined with small rocky islands as far as Peace Island (2° 22' N. lat.), north-west of the mouth of Singhal river. But north of Tapalno Bay the coast-line is low and generally with a sandy beach, and thus it continues to the vicinity of Acheen Head, a distance of more than 300 miles. There occur several good harbours, sheltered from all winds; and as the surf in these parts is less violent, they supply good anchorage. The soundings are regular. Along these coasts there are also some small rocky islands, but they are less suitable for anchorage than some of the islands of the south coast. Between 3° N. lat. and 3° S. lat., a chain of larger islands stretches parallel to the coast from north-west to south-east, at the distance of 60 or 70 miles. The sea between this chain of islands and Sumatra has soundings, but on the outside of this chain the sea is sometimes found to be deep. Between some of these islands there are safe channels. No coast is exposed to a more tremendous surf than the south-west coast of Sumatra, especially that portion of it which is south of the equator. This surf is very remarkable in all its irregularities, for which no sufficient reason has been discovered. It seldom preserves the same degree of violence for two days together; often it rises like mountains in the morning and nearly subsides by night. It does not continue to be violent, though it is much stronger during the south-eastern than during the north-western monsoon. Generally no landing can be effected in European boats, but only in catamarans. The spring-tides along this coast are estimated to rise four feet; the smallness of this rise is a great advantage to convoy, as the unconfined situation of the coast, which prevents any accumulation of the tide, as is the case in narrow seas. The north coast of Sumatra, between Acheen Head and Diamond Point, is the most exposed to the sea, and extends about 150 miles. The whole of this coast is high, and most steeply, especially in the middle near Pessangan Point. The sea is clear of rocks and shoals, and deep. At the distance of from 15 to 12 miles there are no soundings, and no anchorages have been found excepting near the beach. Most of the harbours are open roadsteads, but otherwise the anchorage is good. The north-eastern coast of Sumatra, from Diamond Point to the mouth of the Rakan River, a distance of about
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360 miles, is low, but well defined. North of Delli it is lined with sand-banks, and south of that place with mud-banks, which are traversed by a narrow channel, through which the rivers reach the sea. Along this coast the springs rise from 8 to 10 feet. To the east of the mouth of Rakan River lies a headland, called Onjong Perhaham, to the north-west of which a mud bank extends about 11 or 12 miles. In this part the navigation of the Malacca Strait is very dangerous, as various sand-banks extend across it, with gaps and narrow channels of mud-soundings between them. Farther south is the Island (Pulo) of Tun Pat, extending about 25 miles in every direction. The Salat Rupa, or strait, which divides this island from the main body of Sumatra, admits only small vessels.

Between 1° 36' and 35' N. lat., there are three large islands, called Bencullae, Padang, and Rankan, which are divided from Sumatra by Brewer's Strait, or Salat Panjang. This strait is from 1 to 5 miles wide, but navigable for large vessels. The strait dividing Bencullae from Padang, and that which runs between Padang and Rankan is Salat Ringgit; both of these can only be used by boats. The coast-line of these islands and that of Sumatra in these parts is low and generally swampy. In Brewer's Strait the spring-tides rise 15 feet.

South of the southern extremity of Brewer's Strait, as far as the Strait of Banca, and along the western shores of this strait to Cape Lucepara, the coast-line of Sumatra is exceedingly low. A great part of it is inundated at high-water, and it is surrounded by shoal mud-banks, which extend in some places from 2 to 3 miles from the shore. From Lucepara Point to the eastern entrance of the Strait of Sunda, the coast-line is likewise low, but well defined; it is lined with shoals and mud-banks, which run out from 7 to 10 miles from the shore in some places.

**Physical Regions, Surface, Soil, Climate, and Productions.**—The north-eastern side of Sumatra is a low and level plain; the south-western is either mountainous or hilly. On looking at our maps, one would suppose that each of these

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- it contains several large lakes, as those of Ranap and of Lokantak. The level undulating country which surrounds these lakes is of great fertility, well cultivated, and comparatively well settled. It produces pepper, cotton, indigo, tobacco, sugar-cane, maize, rice, sweet potatoes, and several other roots; and on plantains and pineapple. Gold is said to exist in this region. The numerous rivers which flow eastward constitute the principal branches of the two large rivers Tulan Boanag and Pulembang.

The central mountain-region may be considered as extending from 1° 36' to 35' N. lat. or 1° 40' N. lat. It contains the highest ranges in the whole system, and occupies a much larger tract in width than the other portions of the mountain-region; but the mountains do not extend as far inland as to close the shores of the Indian Ocean. They are divided from this by a comparatively low tract generally 25 miles in breadth, in some places less, and in others widening to 30 miles. This lower tract we are better acquainted with than any other portion of Sumatra, as several European settlements have existed here for two centuries.

The surface of this tract, as Marden says, is intersected and rendered uneven to a surprising degree by swamps, whose irregular and winding course may in some places be traced in a continual chain for many miles, till they discharge themselves into the sea, some of the banks of which are about the fens that are commonly found near the banks of the larger rivers, and receive their overflows in the rainy season. The spots of land which these swamps encompass become so many islands and peninsulas, sometimes flat at top, and often irregular in form, having in many places a most peculiar beauty, and in others descending almost perpendicularly to the depth of a hundred feet. In few parts of the country of Benecoollen, or of the northern districts adjacent to it, could a tolerably level space of 400 yards square be made out. The hollows and swellings are for the most part smooth and regularly sloping, so as to exhibit not unfrequently the appearance of an amphitheatre; and they are clothed with verdure from the summit to the edge of the swamp. Many of the swamps have no apparent outlet.* Marden attributes this surprising irregularity of surface to the springs of water with which these parts of the island abound. The general level of the country rises very gradually to the base of the mountains, where the ascent is very abrupt and rather steep. The soil consists of a fine red vegetable clay, covered with a layer of black mould of no considerable depth. Few stones are found in it. The whole region, except the small isolated spots which are cultivated, is either covered with rank grass, brushwood, and small trees, according as the country has remained uncultivated a longer or shorter time. To the south of Benecoollen it is almost an impervious forest. No country is better supplied with water than this part of Sumatra. Springs are abundant, and the rivers are very numerous. Though none of the rivers perhaps extends 50 miles, and their upper part is full of shoals and cataracts, they are usually navigable for small craft from the point where they enter this low tract to their mouth. But all these rivers have a bar across their embouchure, the effect of the surf which breaks along this coast-line.

There are only two seasons, the dry and wet, and they are regulated by the monsoons. In most parts of India to the north of the equator the north monsoon prevails when the sun is in the southern hemisphere, and the south-western when the sun is in the northern hemisphere [MONSOON]; but on this coast of Sumatra the monsoons are changed by the direction of the land, the north-eastern into a north-western, and the south-western into a south-eastern monsoon. The south-eastern monsoon begins about May and leaves off in September; the north-western monsoon begins in November and blows to the end of March. These winds for the most part commence and leave off gradually; and in the intervening months, April and May, October and November, the weather and winds are variable and uncertain. The south-eastern monsoon blows with great force and steadiness from the end of June to late in September; and during this period rain seldom falls, except in showers, and generally in the night. When the north-west monsoon is strongest, from November to January, the rain is abundant, though in a much less degree than on the coast of Coromandel. The rains do not sensibly abate until March. The quantity of rain which falls annually has not been determined. Thunder and lightning are very frequent. In the south-east monsoon the lightning is more constant; but the
corrections are less vivid, and the thunder is scarcely audible. The atmosphere is generally more cloudy than in Europe, which is prevented from the infrequency of clear star-light nights. The fog, which is observed to rise every morning, astonishes the eye at its extent and the surprising degree, and it seldom disperses till about three hours after sunrise. When the monsoons are in full strength, they commonly pass over the country; but when they abate, and during the intervals, sea and land breezes prevail. The sea-breezes blow in every direction, making nine o'clock in the morning, subsequent to a calm, and declines with the setting sun; the land-breeze begins early in the night, and continues till eight or nine o'clock in the morning. The sea-breezes are regular and steady; but the land-breeze is subject to much variation. It is not uncommon to have breezes of different degrees. The range which lies west of it, and separate it from the lower tract along the Indian Ocean, are only from 5500 to 6500 feet high, but those which lie south of it are much higher; one of the summits, the Bucki Talang, is 19,023 feet above sea-level, which establishes the fact that the country has no lofty summits. But on the north-east side, the mountain-mass of the Kasumba, the highest mountain in Sumatra, which rises to about 15,800 feet above the sea-level, and west of it are the volcanoes of Berapi and Sinabung. The surface of the plain is rather hilly, which than undulating, and the lowest part of it is occupied by the lake of Sincara, which is 1835 feet above the sea-level. The whole country is one continued scene of cultivation, interspersed with numerous towns and villages studded by the cocoa-nut palm. It is the principal export of the cultivated parts of the Island of Java; and Sir Thomas Raffles thinks that the population cannot be less than a million. Every kind of grain, fruit, or root cultivated in any part of Sumatra, is also cultivated on Java and is applied themselves also to manufactures. The waters which descend from the neighbouring mountains to the lake of Sincara are carried off by a river called Ambilang, the most remote source of the river Indragiri, which falls into the Bay of Benjulian, and it is thought that it might be used as a channel of conveyance from the place where it issues from the lake to its mouth.

The plain of Menangraban, not being greatly elevated above the level of the sea, does not materially differ in aspect from almost the entire country of the Indian Ocean; but other parts are more elevated, and beyond the most western ridge the temperature is much lower, so that the inhabitants light fires in the morning and continue them till the day is advanced. To this cold the backwardness of the country is attributed, which is sometimes 20 or 30 years in coming to perfection, and often fails to produce fruit.

The northern part of the mountain-region, or that which extends from 1° to the most northerly extremity of Sumatra, is most elevated, and consists of a hilly surface. This region contains several volcanoes, which may be considered as the connecting link between the chain of volcanoes which traverse Java and the Lesser Sunda Islands. Along this chain are scattered many height, and to the northward through the Bay of Bengal, over Barren Island and Narcondom, to the coast of Aracan, and of which traces have been found as far north as the Tipperah Mountains.

The most southern of the volcanoes in Sumatra, Gunong Dempo, which is known, is near 6° S. lat., and three peaks rise to about 12,000 feet above the sea, and are always enveloped in smoke. A volcano of moderate elevation occurs about 30 miles east of Benoolen, which made an eruption about a century ago, and emitted smoke for a long time. Near 1° 36' S. lat. is the volcano of Gunung Api, or Berapi, which rises to a great elevation. In the elevated mountain-masses which enclose the table-land of Menangraban on the north are the volcanoes of Berapi, 13,193 feet above the sea, and Gunung Sinkalang, which is 12,000 feet. Near the Korideh mountains, and is about 1° 12' S. lat. and 97° 18' E. long., is one of another. Mount Ophir, or Gunong Pasman, which is near 5° N. lat., and 13,650 feet above the sea, has all the form of a volcano, but is not active. The most northern of the volcanoes of Sumatra is the Batangapi, which is near 5° N. lat. and 104° E. long. Several parts of this region have been visited, as the wide valley of the river Musi, between 3° and 4° S. lat., the country of Sungki Temung, between 2° and 3° S. lat., and the coast between the Korideh mountains, and it was found that the western mountain-ranges and their declivities and valleys were nearly uninhabited, but that the valleys and plains of the central portion of the mountain-region exhibited a considerable degree of agricultural industry, and were rather well populated. Pepper, tobacco, and rice-fields are extensive; maize is grown, to a great extent, and also sweet potatoes are cultivated. Near the lakes, as near that of Korindehi, or St. George's Lake, there are rice-fields. Indigo, cotton, and sugar-rames are also cultivated.

The mountains which separate these cultivated tracts from the Indian Ocean are about 3000 feet high, but are descending here in the night-time to 40'. The most remarkable of these countries enclosed within the mountain-region is that of Menangraban, which extends from 1° S. lat. to the equator. It is a plain, extending about 50 miles from east to west, and between 4° and 5° S. lat. The ranges which lie west of it, and separate it from the lower tract along the Indian Ocean, are only from 5500 to 6500 feet high, but those which lie south of it are much higher; one of the summits, the Bucki Talang, is 19,023 feet above sea-level, which establishes the fact that the country has no lofty summits. But on the north-east side, the mountain-mass of the Kasumba, the highest mountain in Sumatra, which rises to about 15,800 feet above the sea-level, and west of it are the volcanoes of Berapi and Sinabung. The surface of the plain is rather hilly, which than undulating, and the lowest part of it is occupied by the lake of Sincara, which is 1835 feet above the sea-level. The whole country is one continued scene of cultivation, interspersed with numerous towns and villages studded by the cocoa-nut palm. It is the principal export of the cultivated parts of the Island of Java; and Sir Thomas Raffles thinks that the population cannot be less than a million. Every kind of grain, fruit, or root cultivated in any part of Sumatra, is also cultivated on Java and is applied themselves also to manufactures. The waters which descend from the neighbouring mountains to the lake of Sincara are carried off by a river called Ambilang, the most remote source of the river Indragiri, which falls into the Bay of Benjulian, and it is thought that it might be used as a channel of conveyance from the place where it issues from the lake to its mouth. The plain of Menangraban, not being greatly elevated above the level of the sea, does not materially differ in aspect from almost the entire country of the Indian Ocean; but other parts are more elevated, and beyond the most western ridge the temperature is much lower, so that the inhabitants light fires in the morning and continue them till the day is advanced. To this cold the backwardness of the country is attributed, which is sometimes 20 or 30 years in coming to perfection, and often fails to produce fruit.

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try about the lake is said to be in a high state of cultivation. The climate of this region differs in one respect materially from that of the coast of the equator. The dry season does not take place during the winter, as is the case on the coast of Malabar, but shows occur frequently during the dry season.

The hilly tract which extends along the north coast of Sumatra, from the valley of Acheen and Queen's Mountain on the west, to the Cape of Good Hope at the mouth of the great river, and about 130 miles, may be considered as an appendage of the mountain-region. From the high coast which bounds the sea the country rises gradually to the south with an undulating and, in some parts, hilly surface, but until it attains an elevation of 300 feet above the sea. The highest part of this tract lies at the back of Pasangam Point, where, at the distance of 10 miles, an abrupt conical peak, called Elephant Mountain, rises to a considerable elevation. West of Pasangam Point the country is less elevated, and Diamond Point is quite low, but the tract behind it is a table-land of moderate elevation. The climate of this country rather resembles that of Hindustan than that of the western coast. The monsoon blows from south-west from May to October, and during its strength, from May to September, the weather is very cloudy and much rain falls, but only in showery. At the change of the monsoon, in October and November, westerly winds prevail and little rain falls. The dry season is less pleasant in this tract than in the northern mountainous districts, which regularly set in towards the end of November, and blow steadily to March. Towards the end of March the north-eastern winds are light and very variable, and so they continue in April. As the rains are not continual, and as the mountains and plains are often met by sand, it quickly absorbs the moisture. Consequently no rivers are formed by the rains, and as the slope of the eminences is very gentle and regular, no swamps are produced, which renders the climate of this tract more healthy than that of the other parts of Sumatra. The soil is tolerably fertile, and produces abundance of rice, much of which is exported, cotton and the finest tropical fruits, such as the mangosteen, mango, and jack, with several esculent vegetables. Cattle, horses, and goats are in great numbers. Principal esculent productions are betel-nuts and pepper.

The country is well cultivated and rather populous.

The Great Plain, which extends over the eastern and probably greater part of Sumatra, from Diamond Point to Tanjong Toca, presents only some variety along the coast, but as far as the interior is known it has a nearly uniform character. The northern part of 2°, as far south as the mouth of the Rahan river, though low, is sufficiently elevated above the level of the sea to be out of the reach of its inundations. Along the coast, level, or slightly undulating. The rivers which traverse this tract have not a long course, but several of them form tolerable harbours at their mouths, though they are rather difficult of access on account of the sand and mud which lie between them and the sea. The country is rather fertile, and its northern districts are tolerably peopled and cultivated. It produces a large quantity of pepper, gambier, tobacco, and rice, with several fruits and vegetables, but is deficient in domestic animals.

The central portion of the plain, extending from Rahan river to Lucepara Point, is extremely low along the seacoast, and a large portion of it is covered with water at spring-tides, and thus converted into a large swamp. This swamp is thickly wooded, and resembles in every respect the Sunderbunds in Bengal. It is uncultivated, and nearly uninhabited, except by some straggling families on the banks of the rivers. This low inundated tract extends from 10 to 30 miles inland. At the back of it the country rises with a high degree of elevation. The trade winds from the east, which spread in a horizontal line from the base of the mountain-region. It is traversed by several large rivers, which on entering the low part of the country expand to a great width. They are navigable to the places where they leave the coasts, and extend in some cases as far as one hundred miles from their valleys. The more elevated portion of the country resembles in soil, fertility, and productions the country north of Rahan river. The cultivation of coffee was introduced some thirty years ago, and coffee now forms an important article of export. The country is tolerably well peopled.

The southern part of the plain, or that which fronts the Sea between Lucepara Point and Tanjong Toca, is less fertile, but has the other part of Sumatra near the sea. Though low, it seems to be sufficiently elevated to be beyond the reach of the inundations at high tides. Towards the interior the land rises, but the rivers, and among them the large river which flows near the boundary between the low and high tracts, are during the rainy season entirely covered with water by the inundation of the rivers. The productions of this tract have not been noticed.

The distinction of south and west monsoons can hardly be applied to Sumatra. Neither the south-west monsoon is felt in all its force. The south-west monsoon is repelled from it by the mountain-region, which shelters the plain in that direction, and the influence of the north-east monsoon is confined to a district about 130 miles wide. The Malay peninsula is traversed by the south-east monsoon, and south-west winds blow, but are seldom felt, because they are either intercepted by long calms in the sea, sometimes two or three days long, or are somewhat more regular, only interrupted by the land and sea breezes. Calms are less frequent than in the south-west monsoon, and the breezes are steady. The weather is much more settled, and thunder and rain less frequent, but is usually hot and sultry. The change of the season is not necessary for agricultural purposes. The heat in summer is great; and at that period the air is saturated with moisture. In the dry season, on the other hand, it is moderated by steady breezes. Though no meteorological observations have been made in this country, the average range of the thermometer is comparatively small, and it is supposed that it hardly exceeds 13° in the whole year. The climate is considered unhealthy for Europeans, especially among the numerous islands of the interior.

The islands which lie near the north-eastern coast of Sumatra, within the Strait of Malacca, are uniformly low, and their soil appears to be chiefly composed of alluvium. But the south-western coast of the island, between 3° S. lat. and 3° S. lat., is fronted by a chain of islands distant, from a little more than a degree. As they are of a different description, they require a short notice.

The most northern is called by our navigators Hog Island, by the Malays Palo Babi, and by the natives Si Raha, and is separated from the mainland by a strait about 50 miles, and is about 10 or 12 miles broad, hilly, and covered with trees. The highest land probably does not exceed 1500 feet above the sea-level. Buffalo and hogs are met with here in great plenty. No safe anchorage is obtained, and the coast is generally steep. The land is usually high, well clothed with trees, and partly cultivated by the natives with rice. The inhabitants are very numerous, which may be inferred from the circumstance that, formerly 1500 of them were annually sold as slaves, most of whom were sent to Batavia, where the female slave is held in high esteem on account of their great docility and talents.

When the English were in possession of the western coast of Sumatra, this traffic was put down, and it is not stated, that it has been revived by the Dutch. Palo Nias produces 1000 or 2000 yards of hemp yearly, a dozen yards of neckers, and the same quantity of cotton goods. It is visited annually by Dutch vessels, the natives burning a large pipe, and trading in small quantities of spices, tobacco, and salt. The islands are inhabited. It produces sago, cocoa-nuts, hogs, poultry, and trepang. Datamur, coconuts, cocoa-nut oil, and trepang are exported to Batavia.
Si Beeroo, or North Porah, called Great Fortune by the Dutch, extends nearly north-west and south-east about 80 miles, with an average breadth of 12 miles. It is generally higher towards the north-west than towards the extremities. Marsden says that this island contains a volcano. We find nothing noticed respecting its productions. Between this island and South Porah is Sea Channel, which is more than eight miles wide, free from danger, and at present much used by vessels bound to Padang and Bencoolen.

Si Porah, or South Porah, extends from north-west in a direction nearly south-east, about 36 miles in length, and is nearly 20 miles wide, decreasing gradually to the southern extremity. There are three good harbours on the east side, Hurlock's Bay, Si Ouban Bay, and Si Labbah Bay. It is also hilly, but less elevated than Si Beeroo. The highest land is near Si Labbah Bay. The western side is very rocky, and the sea breaks high upon the shore; it is destitute of inhabitants. The eastern side is thinly inhabited, and produces sago, yams, and coconuts, with hogs and poultry.

Between this island and North Pogy is Nassau Strait, which is separated from the main body of Sumatra, by the Baniah Islands or Pulo Bania (i.e. many islands), which consist of two principal islands a little separated, one lying to the eastward of the other, with several small ones contiguous to them. On the most northern island is a peak like a sugar-loaf, with the summit covered with forest; it is about 100 feet above the sea, though rocky. These islands produce chiefly trepang and edible birds' nests.

According to Marsden, these islands, with the exception of Engano, whose inhabitants seem to belong to another race, are inhabited by Malays and Javanese, both of which belong to the race of the Malays, but considerably differ in stature and language. The inhabitants of the islands north of 1° S. lat. are called Maruwis. Their complexion, especially in the women, is black; their hair is usually long; their hands and feet are smaller in their persons and shorter in stature; their mouths are broad, noses very flat, and their ears are extended in length in an extraordinary manner. They are, as already observed, remarkable for their docility and expertness in handling the oar. It is usual for the helmsman to take his place some distance from the prow or stern of the craft, and to change places with the rudderman, when the craft turns to starboard or port.

The navigation of the river is very dangerous, on account of the excessive rapidity of the tides, which run seven miles an hour; it has a rise and fall of 30 feet, and produces a very high bore, by which the depth of the water is increased from four feet to two fathoms in less than a quarter of an hour. The river is almost dry at low-water of spring-tides.

The Siack river, which runs more than 200 miles, measured along its course, rises in the mountain-region, and is navigable about 120 miles; it is then joined by a smaller river, which also rises in its neighbourhood. It becomes navigable for boats before it issues from the mountains at Patapah, and where it enters the plain the sloop navigation begins, which continues uninterrupted to its mouth. In this way the gold which is produced in the island of Sumatra is brought to the Strait of Malacca. The river is comparatively narrow, for even at its mouth it is only three-quarters of a mile wide, but it is very deep. The entrance of the river also is narrow, as a sandy spit, which is nearly dry at low-water, extends along the shore, which is only a quarter of a mile thick; it is afterwards joined by Brewer's Strait, and this probably is the reason why it has no bore, like the other rivers along the north-eastern coast of Sumatra. The tides rise about 12 feet at full and change, and their velocity is about two miles and a quarter per hour.

The Kampar falls into the Strait of Malacca at its most southern extremity, nearly opposite the Strait of Singapore. Its upper course lies within the mountain-region, or at least where the greatest quantity of coffee which is brought down the river and sent to Singapore. It is said to be formed by two large branches, which unite near its mouth, and each of these branches runs for twelve or fourteen days' journey through a well-cultivated country, with several villages and inhabited islands. The river is navigable for large boats. The harbour at the mouth of the river is not much visited by European vessels, on account of the velocity of the tides, which rise 15 feet, and run from four to six miles per hour. They produce a considerable bore. The coffee and other articles of trade are brought from this river to Singapore by the Malays in boats of 50 to 200 pekuls burden, which is equal to from 4 to 16 tons.

The next river is the Indragiri, which falls into the Strait of Duriang opposite the Straits of Malacca. N. lat. has the appearance of being still larger than the Kampar or the Siack river. It rises in the centre of Muangacabu, in the lake of Sinkara, a little more than 1000 feet above the sea-level, and runs about 100 miles within the mountain-region in a south-western direction. Its exit from that region is marked by a cataract near a place called Saluka. It is not known whether the river is navigated above the cataract, but probably it is so, for large boats from 3 to 20 tons burden are used below it. At Lubok Rama-ruma about 50 miles above this river navigation begins, and is not interrupted. The mouth of the river is very wide, but subject to a very dangerous bore: it is rarely visited by European vessels, but the Malays bring it from great quantities of rice to Singapore.

The whole course of the Indragiri probably is not less than 300 miles.

The Tamba river drains a great extent of country: according to the best maps, all the waters from 2° 10' to 2° 30' S. lat. form part of the mountain-region between 12° and 13° N. lat.
find their way to it. One of its upper branches rises in St. George’s Lake, in the country of the Korinchie. The several branches which flow from the mountains unite nearly mid way on the lake, and then they fall into the sea, about a mile from the mouth of the river. To this place large vessels may ascend, or at least to the town of Lamba, which is 60 miles from the sea. Below the town the river divides into two arms, which unite about 30 miles lower down, and continue for about 10 miles. Not far from the place where the river begins to run in one channel it divides again as into two arms, which enclose a large delta. The western arm is called Qualia Nior, and the eastern Qualia Sari. By the great change which they experience on reaching the sea. Only the most eastern and western arms are navigable for vessels of small burden, and even in these the navigation is intricate and dangerous, on account of the shoals and sand-banks. This river however has no bore, which is probably owing to the circumstance that the embouchure runs northward into the sea, and are protected by the projecting cape called Tanjong Bon, or Jabon, from the swell of the sea.

The largest river of Sumatra is the Palembang, whose numerous upper branches originate in the mountain-region between 2° 30’ and 5° S. lat. The most southern of them brings down the waters of the large lake of Ranan, but this branch is little known. The best-known of these rivers is the Baroos, which, the district in which it rises is inhabited by a race of negroes, on the back of the range of hills visible from Bencoolen, and, on that account, has the name of Ayer Musi in the early part of its course, but in the lower is named the Tarong. The Musi river becomes navigable for boats before it leaves the vicinity of the town of Palembang, and is about 10 miles from the sea. Most of the southern districts of the mountain-region send their goods to Palembang, and receive by this river those foreign articles which are consumed by the inhabitants.

On the coast of Southern Sumatra, near about the vicinity of the town of Palembang, where the river is above a mile wide, and is navigated by vessels not drawing more than 14 feet. Vessels of a larger description may navigate it, but they meet great difficulties on account of the rapids and falls. From Palembang downwards the river is called Palembang river. After the confluence of its numerous branches it turns northwards, and begins to divide into several arms, reaching the sea with four mouths, which, with the intervening islands, occupy a space of more than 24 miles on the shores of the Strait of Banca. These arms are called from east to west Salse river, False river, Palembang river, and Salt river. The depth of these rivers varies between 3 and 10 fathoms: but in front of their mouths is an extensive bay, and a sand bank, within which there is a large black mud, which is hardly covered at low-water. The channels across this bank have only from 1½ to 2 fathoms at low-water. At the full and change of the moon the tide rises from 7 to 8 feet.

The Rama river is the most southern of the larger rivers of Sumatra. It rises also in the mountain-region, but very little is known of its course, and nothing has been noticed respecting its navigability.

Climate.—The great equability of temperature on all the coasts and lower parts of Sumatra is mainly owing to the circumstance of the island being comparatively narrow, for the wind which comes directly from the sea is not so warm as that which has passed over large tracts of land in tropical countries. On the west coast, south of the equator, earthquakes are common, but in general they are very slight, compared with those of South America and other countries. Marsden however mentions one which was experienced at Manna in 1770, and produced great changes in the surface of a considerable tract. Waterspouts are very frequent along the western coast.

Productions.—Rice is cultivated in the lowest plains and in the elevated valleys of the mountain-range. The kind of rice are very numerous; but all are divided into two sorts, the wet rice, or the dry rice, whereby the former is less prolific, but more valuable. Sometimes the produce is so great that it yields 140 times its seed, but generally only 30 for one. Rice forms an important article of food both to Hindustan, and from the north-eastern coast to the British settlements on the coast of Malacca. No other grain seems to be cultivated, except maize. Neither wheat nor millet is cultivated. The most common esculent vegetables are different kinds of yams, both red and white; the St. Helena yam, sweet potatoes, common potatoes only in the more elevated districts; redy a kind of spinach; baucolus, or the Spanish radish; the large purple brinjall, or egg plant; and many different sorts of beans, with white and pink peas and broad beans, and onions are articles of export from the north-eastern coast to Penang and Singapore. Chili or capsicum, turmeric, ginger, coriander, and cummin-seed, are raised, especially on the western coast. Hemp is extensively cultivated, but only for smoking with tobacco. Tobacco is also grown, and is an article of export from the harbours on the north-eastern coast. Melons are raised on the plains, and sometimes attain an extraordinary size. Sesamum is cultivated for its seed, but the flowering plant which is obtained, grows wild. The sugar-cane is only cultivated for chewing; no sugar is manufactured, but it is imported from Java. The plantations of betel vines are extensive. Indigo and cotton are raised for domestic consumption. The fine land on the islands of the Indian Archipelago, is noted for the variety of its fruit-trees. The most important is the cocoa-nut tree, which grows even in the districts whose elevation does not exceed 1000 feet above sea-level, as in Malacca. There are also plantations of plantains, banana, the bread-fruit tree, jack-tree, mangoes, mangusteens, durians, mango, different kinds of orange and lemon trees, especially the shaddock: the pine-apple, the jackbo, the guava, the papaya, the custard-apple, the longan: and a great many kinds of fruit which do not succeed: vines have been planted by Europeans, but with indifferent success. Besides these fruits, which are cultivated, Marsden enumerates fifteen kinds which grow wild and bear edible fruit. A dwarf species of mulberry is raised in the plantations, but not to any extent; raw silk is imported from Singapore.

Other plants and trees are cultivated as producing articles for exportation. The most important is the pepper-vine, of which large quantities are raised in the mountain regions in the most elevated districts. From no other country in the globe are such quantities of pepper exported. The second as to importance is the areca-palm, which grows most abundantly on the coast between Acheen Head and the Moulouka; and from which the greater part of the pepper exported. Coffee has lately been cultivated to a great extent on the shores of the Kassar river and in Manenehau. Sago is grown in several places on the eastern plain, but especially on the island of Rantau; large quantities are annually sent to Singapore. In 1798 the English brought from the Moluccas the clove and nutmeg trees, and planted them on the west coast, near Bencoolen, where they succeeded so well, that a considerable quantity of cloves and cloves was exported before the last year. The pepper vine of the Banks Island, and pepper of the Moluccas do not attain the size of those from the Banda Islands.

The tree from which the camphor-barus is obtained grows only in the northern districts, between 8° and 9° N. lat, in both of the territories of the Dutch and English. The article has received its distinguishing name. This expensive article goes to China by way of Singapore. The wood is much valued for carpenters’ purposes, being easy to work, light, durable, and not liable to be injured by insects. In the same district the tree grows from which benzoin, or the Benzoin, is obtained; and those which yield cassin. Dammer, a kind of resin, which flows from several kinds of trees, is collected abundantly. In most places there are the dragon-blood trees, and some kinds of trees from which camphor is obtained. Agarwood is also found in this country. The trees of the eastern plain are covered with different kinds of canes, known by the general name of rattans, large quantities of which go to Europe and China. The forests, which cover perhaps more than three fourths of the island, contain a great species of oranges and endless varieties of lemons, but the tea-tree is not among them. The most useful are the pump, used as marks or spars; the marau, used as beams for ships and houses; the iron-wood tree, the ebony-tree, and the koa are also valuable. Several kinds of valuable woods are occasionally exported to the Dutch or English settlements, Sapan-wood, lauc-wood, and some dye-wood go to Padang and Singapore from the eastern coast.

The most useful of the domestic animals is the buffalo, which occupies the place of cattle in Hindustan. The buffalo is used as an ox for land purposes, and as a beast of burden. It is very good for agriculture purposes and as an animal of burden. There are two kinds, white and black. The flesh is eaten, but that of the black kind is preferred. The milk is employed in making butter. Black cattle are not numerous, except
on the coast of Pedir, where the plough is drawn by oxen. The horse is of a small breed, but well made and hardy. Those of the coast of Pedir are larger, and exported to the British settlements, where the demand is vast. Chows are few, and of a small size. Goats are numerous, but they are also small. A kind of wild goat found in the forests is much larger. The hog is of the Chinese breed. Few domestic animals are kept by the inhabitants of the great plain.

Elephants are very numerous, especially in the forests of the plain, but they have not been domesticated. The natives kill them with poison for the tusks and skin. The bull elephant is found in one of two common, both with a single horn and the double-horned species. The hippopotamus is rare. Bears are numerous, and among them is the sun-bear. There are different kinds of deer, among which is that diminutive animal the kanchil, called by Buffon 'l'apennit,' whose extreme length is only sixteen inches, and the height ten behind and eight at the shoulders. The wild hog and the hog-deer are frequently met with. The varieties of the monkey tribe are innumerable, and among them the orang-utan is met with. There are sloths and squirrels. The tiger is very large, and frequently destroys men and most animals. There are also tigers, civet-cats, polecats, porcupines, hedgeshogs, and pangolins, a species of manis. Bats are very numerous, although small. Another eastern evergreen forest is inhabited by breakfasting mountain tortoises, of which the guana is eaten. Chameleon and flying lizards are frequent. Snakes occur in great variety, among which is the boa. A few of them are poisonous. The turtle is found in the sea; but they do not frequent it from the coast. It is frequent on the land. There is a great variety of shell fish, among which is the gigantic keema (chima) in Tappanooly Bay, which is more than three feet in its longest diameter, and more than two feet across. The shell is perfectly white, several inches in length, and resembles a segment of an orange. The natives alsed and caught the oysters are frequently found adhering to the roots of the mangrove-trees with which the coast is lined, especially towards the south.

No part of the ocean is so abundant in fish as the sea which surrounds the coast of Penang. Bush Archipelago; but fish seem to be less plentiful on the western than on the eastern coast. Many families on the shores of the Strait of Malacca, and on the coast of Pedir, subsist by the produce of their fishing. The largest bazaar is in Brown's Strait opposite the town of Perak Baut Beef are engaged at all seasons in fishing the trubu, which is a fish about a cubit long; the roe is an article of trade, and the dried fish are sent into the interior of the island. In the Strait of Malacca, there are, as they have been named, many kinds of sharks, the fins of which are exported from the north-east coast to Singapore, whence they go to China.

Besides the common fowl, which is as abundant as in most other countries, there is a much larger kind of domesticated bird, the ostrich. Another large bird, which is a diminutive kind called the bantam. The wild-fowl which is found in the woods differs little from the common sort, except in the uniformity of its brown colour. Among the wild birds the Sumatran pheasant is conspicuous for its beauty. Peaceocks, eagles, and vultures are very rare, but kites, crows, and jackdaws are very common, as well as woodpeckers and kingfishers. The hornbill is abundant. There are several species of storks, pigeons, and doves; and quite a variety of birds of passage. It is said that the island builds the edible nest is only found in a few places along the west coast. There are also parrots, the Indian goose, the duck, and the teal.

The island swarms with insects. The variety of ants is immense, but they are not abundant, but the honey is inferior to the English: wax is exported from almost every trading place of the coast. The silk-worms is reared in a few places.

Sumatra was once noted for its gold, and a considerable quantity is still exported. The place in which it abounds are the mountains which surround the table-land of Me- nangseebau, but it is also found south and north of that country. The largest quantity goes from the mountains to the coast; for the cost of building ship is destroyed in the mountains and Southern Asia. Tin occurs in several places on the great plain, but it is so very little worked, that large quantities are obtained in the island of Banca (BANCA), where it is got with less labour. Copper is found in the northern por-

tions of the mountain region (between 2° and 3° N. lat.), to the south-east of Analaboo, where it occurs in great abundance in an extensive tract: it contains gold, but is not much worked. There is iron of superior quality in the mountains of Menangseebau, where it is worked to a small extent, and also made into various articles. But English and Swedish bar-iron are imported, especially on the eastern coast. Sulphur is obtained from some of the volcanoes, and unknown minerals are found in some places, of which the true place of origin and nature is not known. Salt is extracted from the earth of some caves near the banks of the river Kataun, but it is of inferior quality: it is used by the natives for making gunpowder. Coal has been found on the eastern coast of Sumatra, and is exported to the ports on the western coast, but it is of inferior quality. Very little salt is made, but large quantities are imported.

Inhabitants.—The interior of most of the larger islands of the Indian Archipelago is occupied by a race of negroes called Australian; but it does not appear that since the time a race is found in Sumatra. Marensed indeed mentions two different races which are dispersed in the woods, and avoid all communication with the other inhabitants, and he says that they are called Orang Kolo and Orang Gugu. They live in the tract that separates the country of Labung from Palembang, speak a peculiar language, and eat whatever the woods afford. The bodies of the Gugu are said to be covered with long hair, so that they resemble the Orang-Abung, and nothing is known of them, except that, according to their custom, no man can marry till he has brought to his chiefhead the head of a stranger.

The people of the east coast of the aborigines of the island, the present inhabitants must be considered such. They all belong to the same race. Their languages also may be considered as dialects of the same original language, though they have adopted different forms of writing. They are the same in these points, which have led writers on this subject to divide them into five nations: the Acheenesse, the Battas, the Malayas, the Sumatrans, and the Lampongs.

The Acheenesse occupy the most northern part of the island, and differ considerably as to language, being in general rather taller, stouter, and of a darker complexion. They are supposed to be a mixture of Battas and Malayas with Chulas, as the natives of the peninsula of Hindustan are called, who have frequented the coast, and mingled with them in all ages. They are more active and industrious than their neighbours, and resemble the Bugas, or inhabitants of Celebes, in address and dexterity in business. In writing they use the Malay character. They are Mohammedans, and resemble the planters of the Western coast in many respects. They are of the same faith, the forms and ceremonies of their religion are observed with some strictness.

The Battas occupy the sea-coast on the west side of the island from the mouth of the river Kinta to that of Teybong, and from the east coast of the island to a little land. The Battas are enumerated by the Malayan and Acheesenese establishments in the most convenient maritime situations. They are rather below the stature of the Malayas, and their complexion are fairer. Horse-desh they esteem the most exquisite meat, and for this purpose they feed their horses with great care. They have a language and written character peculiar to themselves: their language contains a smaller number of Malay roots than the other languages of the archipelago. It is read and written. They can read and write are much more numerous than those who cannot; and still more, that a nation, who in this respect, and in their agriculture, dress, and manners, show that they have made great progress in civilization, there is a great number of prisoners taken in war and criminals condemned to die. They have not embraced Islam, and are heathens: they acknowledge three deities as the rulers of the world. [BATTAS.]

The Malayas are divided into two classes, the extension of all other nations, the whole of the great plain from the river Rakan on the north to that of Masusi on the south, and also the shores of the river on the north as far as Tinikia. It does not appear that they are in possession of any part of the mountain region, except the most eastern part of the island. This certain table land was, according to the history of the original seat of their nation, supposed to have spread over the island. [MALAYA] The inhabitants of Meenangseebau.
tungished from all other nations of Sumatra by the advanced state of their agriculture, their manufactures, and civilization; while the Malays, who inhabit the shores of the Strait of Malacca, appear to be a degenerated tribe, and are chiefly occupied by rice. The Malaya inhabit the country of Palembang however show greater diligence in cultivating the ground, and in several branches of industry, which is attributed to the circumstance that this part of Sumatra was for a long time subject to the kings of Java, during which period many Javanese settled in the country. The Malays are Mohammedans, but not strict observers of the ceremonies of their faith.

The name of Sumatra comprehends all the tribes that inhabit the west coast, from the river Tapan to the north coast, 40° S. lat., on the east, and 4° 40° S. lat. on the south, and also occupy the mountain-region south of Manencaubus as far as 5° S. lat. They are rather below the middle stature. Their limbs are generally slight, but well shaped, and particularly small at the wrists and ankles. Their eyes are uniformly dark and clear; the eyes of the southern women particularly bear a strong resemblance to those of the Chinese, being narrow and somewhat lower at the inner angles. The hair is strong and of a shining black. The men are beardless, but they naturally have a beard, which however they take great care to eradicate as soon as it appears. Their complexion is yellow, and much lighter than that of the Hindus. In those of the superior class, who are not exposed to the rays of the sun, are generally in the women of larger size than to fail. It seems that they speak several dialects, which contain a great number of Malay roots; and accordingly they are only considered as dialects of that language, but in writing they use characters as different as the Mohammedan. It is almost certain the Malays have been converted to the Mohammedan faith, but the remainder are heathens, and have no kind of religious ceremonies.

The Lampangs occupy the most southern part of the island, both the mountain-region south of the river Padang-guchi and the plain south of the river Massi. They have a strong resemblance to the Chinese, particularly in the roundness of the face and the shape of the eyes; otherwise they do not differ much from the Sumatrans. They are the fairest people in the island, and the women are the tallest and handsomest. Their language differs considerably, though not essentially, from that of the Sumatrans, and contains a great number of Javanese words, the Javanese having been in possession of the greater part of the country for some time. In writing they use characters peculiar to themselves. The Mohammedan religion has made considerable progress among them, and most of their villages have mosques, but they have still preserved some superstitions of their old religion. The custom of burying Sumatra on a level with respect to civilization. The most advanced are those of Manencaubus and of Aceh, who eschew respect to appear to be inferior to the Javanese, the most civilized tribe of the island. It seems that the arts of civilized life, and even in literature, though respecting the last-mentioned point our knowledge is far from enabling us to form a correct judgment. The other nations are certainly a degree lower in civilization, but this is chiefly to be ascribed to the defect of their political institutions.

According to the history of the Malays, the whole island was once subject to the sovereignty of Manencaubus, and the possession of Manencaubus is still not considered by the veneration which is still shown by nearly all the inhabitants towards those who are connected with the reigning family of that country. From the advanced state of civilization of the inhabitants of Manencaubus, we may infer that the whole island must have been in a much more advanced state when their sovereigns extended their sway over all Sumatra. At present there is in most parts hardly a political union. Every village or town has its chief, who acknowledges only nominally one of the princes or sultans, of which the government is divided into several provinces, but he acts quite independent, and makes war on his neighbours as often as he pleases. There is an almost uninterrupted state of war, the consequence of which is that the condition of the people retains the same. Since the island, which in the 18th century has been exercised by the European settlers and governments has been attended by the happy effect of diminishing these petty wars and promoting peace among the natives.

According to the latest estimates, the population of Sumatra is stated at four millions. Though the data which we possess are few, and refer only to a small portion of the island, we think that this estimate is certainly not too high, and will eventually turn out to be something less than the population of the whole country, which is about 2° N. lat. The remainder of the south-western coast, with a considerable part of the mountain-region, and from 3° to 5° S. lat., is either immediately subject to the Dutch or governed by princes dependent on them. The independent states are Acehn, Siaick, Indragiri, and Jambi on the coast, and that of the Batins in the interior.

1. Aceh occupies the most northern part of the island. When its government was in full force, it extended as far as the town of Baroo on the south-west coast, and as far as the river Batu Bura on the east coast. It terminated in the interior at the mountains, in which the Sinkel river rises, and where the Batins territories begin. In course of time the powerful vassals on the east coast obtained their independence, but those on the north and west coast are still considered subjects of the king of Aceh, though they are considered by that country as foreign and out of the country is probably 20,000 square miles. A short description of it and of the capital is given under Aceh. The capital is the principal seat of government, but there are other several ports, which are annually visited by some foreign vessels, and also carry out private and commercial ships. On the coast between Aceh Head and Diamond Point, from west to east, are the harbours of Acheen, Pedada, Lawang, Pedir, from which the whole tract is called the Coast of Pedir, Pakan, Seu, Burong, Sarong, Merdeo, Sambalang, Pangan, Junka, Tapoos, and Corty, among which those of Pedir and Telakumony, next to the capital, are the most thriving and commercial. The chief article of export from these ports is areca-nut, one of those from which the harbours of Pulo Ryah, Acheen, Telamulan, Tamang, Taddow, Tareepuli, Scimeyen, Qualia Batto, Booso, Manghin, Labuun Haji, Telapow or Talapow, Sama Dus, Tampat Tian, Kavati, Salnath, Pulo Dus, Ramong, Sebadis, Tarkoman, Ayam Dammsamian, Sat, at the mouth of the river of that name, and Tapoo. Large quantities of pepper, benzoin, and camphor-barus are sent from these ports. The chief trade of Aceh is with the British settlements in the Strait of Malacca, and especially Penang; but there is also British and European trade between it and Bengal, Madras, and Bombay. Besides this the ports are visited by American vessels, French ships, Arabian vessels from Mocha and Jidda, Parsee vessels from Bombay, and vessels from the Maldives, and Islands, and Portuguese vessels from Macao, the Chinese and Dutch ships bound directly for China take in parcels of areca-nut for that country. In 1823 twenty-seven American vessels obtained cargoes on the western coast, chiefly pepper in exchange for Turkish opium and Spanish dollars, to the value of about a million of dollars. The articles of export, according to their value, range as follows: areca-nut, pepper, camphor, benzoin, gold-dust, Aceh piece-goods, damar, rattans, bees-wax, rice and paddy, elephants' teeth, tobacco, and tobacco leaves, rice, rice and corn, iron, steel, cutlery, brass-ware, arms and ammunitions, China goods, and Chinese rice, and goods from the Maldives. Four or five large Arabian vessels from Jidda, Mocha, and Surat touch annually at Acheen, landing pilgrims on their return from, and conveying others to
Mecaa, to the number of one thousand. They import salt, dates, and Surat piece-goods.

The countries south of Diamond Point, which were formerly supplied with Chinese, ivory, gold, tobacco, tea, but are at present governed by their own independent rajas, or sultans as they are called, contain several ports, among which those of Langkat, Balu, China, Delli, Sarang, Batu Bhar, and Assahan are the principal. The staple of the four last places is nominally dependent on the king of Sienc. It appears that the authority of these petty princes does not extend far from the sea, as the inland country is inhabited by the Batas, who however send the greater part of their produce to these ports. Batu Bhar and the other staple of the four first-named places, but some other articles also are exported, to a considerable extent, as rattans, rice, paddy, and several kinds of pulse, especially white and green peas, gambier of very good quality, especially that of Batu Bhar, rice, Indan, good calico, and coarse cotton. The staple of the villages, from Sienc to Shanghai, and from Shanghai to the coast of China, is teazal, or tea. The export is almost the same for all these districts.

The imports consist of cotton-cloth from the neighbouring countries, which is called coast cloth, chintzes from Surat and Europe, white cloth from Europe, raw silk and cotton, silk stuffs, especially taffetas, which here are prepared by spinning, weaving, and cooking-pots from Siam, called qualities, iron and steel in bars and sheets, iron, steel, Chinese gold-thread, Java tobacco, precious stones from Ceylon, gunpowder, tin, muskets, and swivels. The most important articles are salt and opium. Occasionally a large quantity of timber is exported from Sienc to Penang, Pulo del Lawang, and other places on the Kampar river have lately risen into notice as trading-places on account of the great quantity of coffee which is annually brought by numerous small fleets, consisting of from 10 to 12 prahus, to Singapore. The other articles of export, which however are not important, are gambier, bees'-twine, twine, cassa of an inferior quality, ivory, rhinoceros-horns, and rattans. In return are taken blue and unbleached Madras cloth, raw silk and cotton, and cashmere and coarse cotton, and a limited quantity of balcke handkerchiefs and salindangs, camel's hair, iron, steel, Chinese gold-thread, Java tobacco, and stick-lac.

The islands which lie on the east of Brewer's Strait belong to Sienc. The largest of them, Raakan, is low and marshy: there some piece-goods are imported into Malacca and Singapore for the manufacture of pearl-sago.

3. Indragiri is a kingdom of small extent, comprehending only the countries on both sides of the river of that name, which, extending to the north of the Soemul scoot region, where it borders on Menangacabu. Its territories are said to be fertile, and capable of producing abundant crops of rice, of which considerable quantities have within a few years been exported to Singapore. Its cotton is of the first quality; in fact, all the articles mentioned as exports of Kampar, but in smaller quantity. Opposite the mouth of the river is the island of Lingin, and from that island northward to the capes of Burus and Romamna and the port of Singapore, the sea is literally strewed with islands and innumerable rocks. Such a sea is favourable to piracy; and as this extremity of the China Sea is much navigated, partly on account of the rich countries in its vicinity (Java, Borneo, Sumatra), and partly as being the great thoroughfare of the commerce between the European and the Pacific, the island of capsules, or Lannus (Philippines, vol. xvii. p. 87), whose original country is the island of Magindanao, have pushed their settlements, which are found in all parts of the Indian Archipelago. In former times Raakan was placed about at a place called Rittah 30 years ago, or less than ten years before the foundation of Singapore. This is the most western settlement of these pirates.

4. Jambie is the most southern of the independent states of Sumatra. The boundary-line between it and the Dutch kingdom of Palembang begins on the shores of the sea near 2° S. lat., and extends south-west to the mountain-region, where it terminates near 3° S. lat. The present capital, Kampar (chosen in 1815), is situated a day's voyage above Old Jambie, which is 60 miles from the sea. The population is about 4000, among which there are fifty Arab families. The produce of the country is dragons' blood, gambier, benzoin, and a variety of rattans, with some gold-dust. These articles are taken to Singapore, which supplies Jambie with Chinese and European coarse ware, as well as opium and Siamese salt, which finds its way hence into the interior of the island.

5. The country of the Bataas occupies the interior of the island between 2° and 3° S. lat., and is only separated from the sea by a narrow tract of land, which is settled by the Malays and Acehnese, and governed by petty chiefs of those nations. In this country the greatest part of the amorphous, heterogeneous, lowland state of Bataas has been thrown off, and all the regions mentioned above from Sumatra, as also large quantities of pepper and ivory, with other articles: a small portion of these products goes to the numerous small harbours of Acehun on the south-west coast of the island, but the large part is exported to other countries, China, Delli, and Suratt, on the S. of Malacca.
country of the Batavia is divided among many independent hereditary chiefs, who are frequently at war with each other.

The Dutch possessions extend perhaps over half the area of the island. The southern portion of the plain is subject to them as far north as a line which runs near the mountains in the vicinity of 3° S. lat., and on the shores of the China Sea terminates near 2° S. lat. The greatest part of the mountain-region south of 2° N. lat., though governed by their own chiefs, acknowledges the supreme authority of the Dutch government. It is therefore probable that part of the last mentioned region have still preserved their independence. As the larger part of these possessions has been acquired within the last 20 years, the Dutch government a few years ago undertook a systematic division into five regencies. Palembang, Lampung, Bengkulu, Padjad, and Ayer Bangkis. The first two are placed under the governor-general of Java, and the three last-mentioned regencies constitute the government of the western coast of Sumatra.

1. The Regency of Palembang comprehends the kingdom of that name, and though the king keeps his title, the country is under the administration of the Dutch regent, but the power of the regent is very much circumscribed by that of the native chiefs. The boundary-line between Palembang and Lampang is mainly formed by the river Musai, which runs near 4° S. lat. This extensive country is thinly inhabited, the population being stated not to exceed 140,000 individuals. The three principal settlements of the regency are Kaap, Run, and Lampong, 25,000 inhabitants. The houses are of wood or bamboo, and there are besides the palace of the sultan and the principal mosque, which are of stone, and in the centre of the town. Though this place is about 70 miles from the mouth of the river, it carries on a considerable trade. The rice is exported in large quantities for vessels. It exports the surplus of its produce to Java, Banca, Rhio, and Singapore. The exports consist of gold-dust, ivory, rattan, pepper, gambier, resin, bees-wax, benzoin, masts, and silk stuffs, dried fish and copper-ware: the imports are spices, cotton-cloth, sugar, oil, gold-wire, iron and steel, ironmongery, cutlery, raw silk, teas, and some minor articles.

2. The Regency of Lampung comprehends that portion of the mountain-region which borders on the River Musai, and that portion of the mountain-region which surrounds the bays of Lampang and Samangkai. It terminates on the west near Flat Point. This part of Sumatra was formerly part of the possessions of the sultan of Bantam in Java, and passed with the other possessions of that monarch to the Dutch. The level part of the country is very thinly inhabited, and exports to Batavia only rice, pepper, and a little cotton. The only settlement of the Dutch, and the place where the regent resides, is Manisla, on the banks of the Tulan Bungkay, which is the only town of importance in the mountain region on Lampang Bay at Telok Bintong. The inhabitants of this tract gain their subsistence partly by selling provisions to the vessels which sail through the Straits of Sunda. The Dutch have over 3500 inhabitants.

3. The Regency of Bengkulu begins on the south at Flat Point, and extends northward to 1° 55' S. lat., comprehending the greater part of the mountain-region which is subject to the Dutch. South of 3° S. lat. the coast is difficult to be approached, and only one small harbour exists at Croi; but farther north they are more frequent, as Kauwir, Manoa, Silehar, Bengkulu, Laye, Ipoo, and Moco-Moco. From these places pepper is exported, and this is almost the only article of export, with the exception of some gold-dust and diamonds. The principal manufacturing articles are iron and steel. Bengkulu is the seat of the resident. [BENGOLEN.] The population of this regency is estimated at 160,000 inhabitants.

4. The Regency of Padjad comprehends the mountain-region and the west coast between 1° 55' S. lat. and the equator. It therefore embraces the antient kingdom of Menengabau, whose population Raffles estimated at more than an million, and which a few years ago was subjected to the Dutch. South of 1° lat. and radius, the country abounds with gold, of which those situated in the district of Tega Blang Kota are considered as very rich, more especially those of Songgi Pago and Si-Payong. They lie to the east and south-east of these districts. The exports of this regency consist of a large quantity of coffee and of peppers, and cotton-cloth and gold dust: the imports are opium from Bengal and Mawra, cotton-cloth and handkerchiefs from Coromandel, raw cotton, salt, and tobacco from Java, and a few other articles.

The town of Padang, the residence of the governor of the west coast of Sumatra, and of the regent of Padang, is a small but well-built place. Ayer Adji is a small port.

5. The Regency of Ayer Bangkis comprehends the mountains and the west coast between the equator and 2° N. lat. Along the coast it extends somewhat farther north, as the town of Baroa is also subject to the Dutch. In the southern districts of the mountain-region also there are small towns inhabited by different tribes, and occasionally visited by the Dutch. They are divided into five regencies. Lampung, Bengkulu, Padang, and Ayer Bangkis. The two best harbours of Sumatra, the bays of Ayer Bangkis and Tampoon, are within these territories, and there is a good harbour also at Natal. Ayer Bangkis, the seat of the resident, is a new place, and was hardly more than a village before it was made a town, inhabited by settlers from Achense, Kan, and Menang-cabau, all of whom are engaged in trade. On the Bay of Tampoon are a few European commercial settlements. The exports of this regency consist of gold, pepper, camphor, benzoin, cassia, and a few minor articles: the imports are those noticed under the regency of Padang.

Manufactures.—Nothing perhaps shows more clearly the advanced state of civilization of the inhabitants of Sumatra than their manufacturing industry. The most important manufactures are those of iron and steel, which are carried to a considerable degree of perfection in Menangabau, where iron has been worked from time immemorial. The kris (dagger) blades made here are famous all over the East. The kris is a native weapon, and several kinds of tools are made. Large quantities of fine silk-cloth are made at Batu Bharra, and this branch of industry seems to be much attended to along the eastern coast, as raw China silk is imported at nearly all the trading-ports. The silk is made at the island of Batu Bharra in the manufacture of cotton-cloth was formerly equally extensive. Marsden commends many of these cloths for their fineness and the taste of the patterns; but though this branch of industry is still carried on in many parts, the produce of others has been superseded by the introduction of English manufactured goods. Earthenware is made on an extensive scale at several places, especially at Menangabau, whence Padang and Bengkulu are supplied with this article. The beautiful gold and silver filigree work which has long been admired, though it is executed with very coarse and imperfect tools. There are goldsmiths at every trading-place on the west coast. The Dutch government has long sought to establish a factory on the river Tulan Boow, in the country of the Lampangs, to suppress the slave trade, and to establish a king of Palembang to establish one in the capital of that country. Hence affairs remained to the year 1811. Both the Dutch and the English had acquired authority with the
petty chiefs who governed the countries adjacent to their settlements, not by force of arms, but by conciliatory means; and they had induced them to leave off the continual wars, and to attend to the cultivation of the pepper and other articles of export. In 1811 the Dutch possessions, together with the island of Timor, were transferred into the hands of the English. Shortly before that event the Dutch had a quarrel with the king of Palembang; and to avenge it, the British, in 1812, sent an armed force to his capital, took possession of the island, together with all the right of wood, stone, and other materials which where, up to that time, the Dutch had only had some mercantile establishments for the purchase of tin. [BANCA]

After the peace of Paris, in 1816, the Dutch colonies on the Indian Archipelago were restored to them, together with the island of Java. This left the British with the right to the possession of the country of the Lampangs, which they derived from the English. That country had always been considered as an appendage of the kingdom of Bantam in Java. In 1816 the sultan of that country had voluntarily made over his sovereignty to the English government, in consideration of an annual pension of 10,000 dollars, and thus the country of the Lampangs came into the possession of the English; and, in 1816, of the Dutch. After 1816 the Dutch possessions on the Archipelago had, in 1821, expelled the Dutch troops stationed in their capital, but was soon obliged to yield to the army which was sent against him, and to surrender his power to the Dutch government, who took possession in the name of the British.

In 1824 the Dutch acquired the British settlements on Sumatra by treaty. These settlements had always been a burden to the East India Company: the expenses which they caused generally amounted to four times the number of the inhabitants, who were confined in their commerce in the Strait of Malacca was much confined by the English, who had a settlement on Pulo Penang, and established another in 1816 on the island of Singapore. This was occupied in 1819 by the British. Thus the Dutch found it expedient to give up to the English the town of Malacca and some settlements in Hindustan in exchange for the British settlements on the west coast of Sumatra. The latest accession of territory to the Dutch possessions took place in 1825, in consequence of a war with the Padres. The Padres are a religious sect which began to appear in the country of Mencangebau about the beginning of this century. As the inhabitants of the country are Mohammedans, many of them became a pilgrimage to Mecca. One Hadji Mosek, who had been there, was, on his return from Mecca, the first teacher of the tenets of the Padres. He recommended the suppression of those practices which led to ruinous consequences, gambling, smoking opium, and drinking intoxicating liquors, and he inveighed against the consequences of thefts, fraud, robbery, and the deplaved state of society. For about fifteen or sixteen years this doctrine was propagated only by conviction and persuasion, and he acquired many adherents; but, in 1823, some of them were armed among the principal adherents of this new doctrine, for the purpose of compelling the other inhabitants to conform. The wars which arose devastated for many years the country of Mencangebau and some adjacent districts. The fanatical Padres were mostly victorious, especially under the conduct of Toooka Passumman, who subjected a large tract of country to his sway. It is said that several members of the ancient royal family fell by his hand, and he cruelly oppressed those whom he had conquered. Some of them, however, escaped to the island of Java, where they were protected by the British, who restored them to their country.

A few years afterwards the Padres were driven to the island of Java and the British government took up their cause. Though the issue of the war which thus commenced was doubtful for two years (1833 and 1834), the military skill of the British army, and the courage of the Padres, to which the result has been that the whole country of Mencangebau is now included in the Dutch possessions. Thus the Dutch, in somewhat more than twenty years, have succeeded in founding an extensive empire in this part of the East. [Macdonell's History of the Indian Archipelago; Heyne's Historical and Statistical Tracts on India; Anderson's Account of a Mission to the East Coast of Sumatra; Lady Elphinstone's Memoirs of the Life of the Right Hon. Lord Melbourne; Moor's Notices on the Indian Archipelago, Singap., 1837; Anderson's Achar and the Ports on the North and East Coast of Sumatra; Hogendorn's Coup-d'œil sur l'île de Java et les autres possessions Néerlandaises, &c.; and Horsburgh's Indian Directory.]

SUMBA, SUMBAWA. [Sunda Islands, Lesser.]

SUMY, a large town in the government of Slubodzke-Ukraine, in East Galicia, on the river Dniester, and 39° E. long., on the river Psel, at its junction with the Suma. It is surrounded by a wall and ditch, and has also an ancient citadel. It has two stone churches and some of brick. It is a market, and is built of brick. There are several charitable institutions, public deports, and warehouses. The number of inhabitants is above 12,000, whose chief employment is tilling, gardenng, pasturing, and distilling. They have no manufacturer, but a large trade in the produce of the country, especially at five great annual fairs, which are much frequented. At one of these fairs large purchases of horses are made on account of government for the Russian cavalry.

(Schneller's La Russie et La Pologne: Hassel; Hörnsehalmann.)

SUN (Latin, Sol; Greek, Ρας, Ήλιος). In the present article we confine ourselves to the astronomical characters of the sun's light, and to what we know of its physical constitution. The power of light is seen when divided into two kinds, time, and space; see TIME; on chronology as dependent on this body, and on the more common characters of its motion, see YEAR. See also MOON; SEASONS; ASTROLOGY; ZODIAC (or mythology); ZODIACAL LIGHT; TWILIGHT, ETC.

It is needless to say that if the utility of the subject of an article were to determine its length, the one we are now commencing ought in justice to occupy several volumes of the work; we are however seriously to meet out the importance of the subject, which consists in the Sun being the source of all life; to the Sun, the greek would not be more quiant than that of Sir John Hill, who says that this luminary is 'enough to stamp a value on the science to which the study of it belongs.' In relation to astronomy this is particular; the Sun being the preserver of life, and to keep order, without any knowledge of the moon, planets, or stars; but to do this without any acquaintance with the sun's motions would be absolutely impossible. The source of light and heat, and through them of the alternations of the vegetable world, is in the highest secondary sense, the giver and sustainer of life; but this very importance ensures names to so many results of solar phenomena, that the present article is stripped of details, by their entering more appropriately into others.

The motions of the sun are in fact those of the moon, written in the heavens. If the diurnal motion of the earth were stopped, the sun would appear to move slowly among the stars, from west to east, at the rate of about twice its own diameter in twenty-four hours by the clock. This [Morton] is seen in the case of the moon, and it will be seen in the case of the sun, when we ascertained the interval between two meridian passages of the sun, which is a little longer than the sidereal day (about four minutes), or than the actual revolution of the earth; so that all the stars have their turn, and every star turns on its own pole at every period of the natural or solar day. [SYNODIC; TIME.]

The great phenomena of day and night are attended with very different circumstances in different parts of the globe. We are not specious enough learned to describe the horizons of the high polar regions, north and south, in which the sun never sets for days together, but of those parts of the earth in which there is actual appearance and disappearance of the luminary, or real day and night. Let it be supposed that we are in the sun's equator, when the sun is in the equator (we presume in our reader a knowledge of the terms and notions in Strick, DOCTRINE OF THE). If we take one fixed line to represent the horizon of different places, as BAC, the sun will rise to the east of the north pole, and will go round in the equator, E.W., and to come directly up from the horizon; while at a place near the pole it will move, relatively to the horizon (still
of very distorted dimensions, may be of use: before it has risen above the horizon of the place, so as to be visible, it can throw its rays into the atmosphere above the place, which atmosphere interferes with the sight of the whole as well as of the body itself. This period is called the twilight, and it is said that there is more or less of twilight as long as the sun is not more than 15° below the horizon: though certainly the twilight which saves candlelight does not last so long. But, the number of degrees which are allowed to twilight is more or less, it is obvious that at the equator, where the whole of the sun's way is made directly to or from the horizon, the intermediate period of twilight must be much shorter than at a place near the pole, where the motion towards the horizon is very oblique, instead of being all ascent, as before rising, or descent, as after setting. The consequence is well known: in the tropics, the warning is short, and soon after the light begins to break the sun makes its appearance, and it is broad and hot day while after the setting the light as soon disappears, and it is dark night. With us, on the contrary, and still more in higher northern latitudes, there is a long warning of the approach of the luminary before the sunrise, and a long remembrance of it after sunset. In all climates the transition from day to night is broken by the two circumstances mentioned in Seasons. In the same article it is pointed out that the heat received during the winter and summer halves of the year is the same over the whole earth. Immediately after sunrise, and after the sun has passed the horizon, the luminary appears somewhat elliptical, the horizontal diameter being longer than the vertical one. This is the effect of Refraction, which varies so rapidly near the horizon, that the upper end of the vertical diameter is less elevated than the lower end by a sensible quantity, while the two ends of the horizontal diameter are equally elevated. The same phenomenon occurs with the moon, when rising at the full, and would also be seen in the planets, if they were large enough in appearance. It must also be noted that both sun and moon appear larger when near the horizon: but this, as to the sun, is delusion, since when measured with instruments its apparent diameter is the same at all parts of the day. It is true that both bodies, when in the zenith, are nearer to the spectator than when in the horizon, by what may be called without error a semidiameter of the earth; the moon is near enough to show the effect of this in instrumental measurements of its diameter, but it is not so with the sun.

Before looking at what we know of the physical appearances of the sun, its distance from the earth must be mentioned, to which we may add at once the other elements of its orbit. Its equatorial horizontal Parallel, at its mean distance, is 8'5776, and its apparent semidiameter 10'049. It is then distant from the earth by 24,900 semidiameters of the earth, or about 95 million miles. Its diameter is 1114 times as great as that of the earth, or upwards of 880 thousand miles; and its bulk is 13 thousand times as a great as that of the earth. But its mass, as determined from its action on the planets, is only 355 thousand times as great as that of the earth; whence its average density is only one-quarter of that of the earth. But this last result takes into the body of the sun all that is seen of it: if the surmise proudly to be mentioned, of its having a luminous atmosphere of considerable extent, be well founded, the real body of the sun may have as much density as the earth, or more. It revolves on its axis in 233/4 of our mean solar days; according to Delambre, 23°56'14'', the axis being inclined to the ecliptic at an angle of 23°56'.

The ecliptic is the circle in which the sun appears to move, in common language. In strictness however the earth does not move round the sun in a true plane, though it does so very nearly; to the centre of gravity of the earth and sun a point (a point near the earth) does much more nearly describe a plane; that is, a spectator situated at that point would more nearly see the sun move in a great circle than we do. But still, the sun makes its courses on one side and sometimes on the other of this mean ecliptic; and therefore generally has some latitude, though a very small one: the column entitled 'the Sun's latitude' in The Nautical Almanac is a puzzle to those readers whose astronomy is drawn from the usual elementary treatises. But in truth, it is but a fraction of a second, and the sun crosses the mean ecliptic twice in every lunation. The obliquity of the mean ecliptic, for January 1, 1843, is 23°27'34''23, and it is diminishing yearly by 00''21'. The same obliquity for January 1, 1844, is 23°27'25''69. If this diminution could go sufficiently far, it would in time bring the ecliptic and equator to coincidence, or equalize days and nights all over the world; and if it could be held to have continued long enough, would cause the circle of the sun to reach the equator, that is, the whole of the ecliptic, or that every part of the earth went through all gradations in a year from equal days and nights to a polar day and a polar night. But the cause of this diminution of the ecliptic is known from the theory of gravitational attractions, remembering the fact of tropical productions being found buried in high latitudes, sometimes imagining that they can look back to the time when the poles were so near the ecliptic, that these same high latitudes were included within the tropics. This however is a pure fancy, and, they had better imagery another cause; the one they think will not do.

The mean longitude of the sun, at Greenwich mean noon on the 1st of January of the year 1800 + 4, may be defined from

\[ 280^0 53''39''75 + 27''0508441 + 000192180554 - 14''4470898 - f \]

where \( f \) is the remainder of \( t \) divided by 4, or 4 if the remainder be 0; that is, the number of years after the year 1800 for which the mean longitude of the sun is given in this form. The mean longitude of the sun on January 1, 1801, was 279°30'00''. It has a real yearly increase of 11°8, which, with the precession of the equinoxes, makes an increase of longitude of 61°9.

The appearance of the sun is simply that of a ball of intense light, such as the human eye cannot bear, unless a haze atmosphere or a dark glass be used as a screen. This light is so strong, that the brightest flames which human art can produce, when held before the sun, disappear, and the most united and readily inflammable materials are consumed like quicklime," says Sir J. Herschel, 'in Lieut. Drummond's oxy-hydrogen lamp, gives the nearest imitation of the solar splendour which has yet been produced. The appearance of this sun was however as described, merely a dark spot, 'in an instrument which can penetrate the air,' over a considerable portion of its surface. The experiment ought to be repeated under favourable circumstances. A very small portion of the rays collected into one spot [BURNING GLASSES] is sufficient to melt metals. On examining the face of the sun with a telescope and camera, a dark spot sooner or later appears, in the innermost of the four annular rings. The experiment is much easier when the sun is a little to the west of the meridian, as the thin part of the moon is better seen, and the sun is not so much obscured by it. But as the observer must not approach too near to the sun, there is some difficulty in taking the trace of a dark spot, and it is better to observe it just before the sun begins to set. But if the observer is placed in a constant state of change. Then nothing which represents so faithfully this appearance as the slow subsidence.
of some floculent chemical precipitates in a transparent fluid, when viewed perpendicularly from above; so faithfully does the sun receive his image, and obtain with the idea of a luminous medium intermixed, but not confused, with a transparent and unluminous atmosphere, either floating, or clouds in our air, or pervading it itself, that it is hardly possible to conceive. However, with the idea of a luminous medium intermixed, but not confused, with a transparent and unluminous atmosphere, either floating, or clouds in our air, or pervading it itself, that it is hardly possible to conceive.

The mind is lost in wonder at the idea of such a body of luminous material: but it is important to remember that this is an instance of the way in which the rotation of the body on its axis has been determined. These spots are of various irregular shapes, and are always surrounded by a border or penumbra, so dark as the rest. They are of various sizes, from the least visible to the twentieth part of the sun in diameter. In their neighbourhood are frequently observed streaks on the disk more luminous than the rest, called faculae, in which streaks spots frequently begin their appearance. The spots vary in their appearance from day to day, during various times, from a few days to six or seven weeks; the borders approaching each other in a manner which calculation shows must answer to hundreds of miles a day. Various theories have been invented to account for this phenomenon, but none were ever published, except that of W. Herschel (Phil. Trans., 1801). He supposes that the sun has an atmosphere of greater density and depth than that of the earth; and that above this atmosphere the rays of the sun are stopped by the higher regions of the atmosphere. At the same time, the atmosphere of self-luminous clouds, of very variable thickness, sometimes showing the lower atmosphere uncovered, which last reflects the light of the luminous atmosphere above it. A spot on the sun is a portion of the body of the sun itself, filled with hot gas, or the luminescent matter, or the sun's atmosphere, or the greater portion of the penumbra round the spot, its never-failing attendant, arises from the ridges of the lower atmosphere, which form the banks of the opening. The faculae, and general mottled appearance of the sun, arise from the luminous atmosphere having waves or ridges. From some measures of the light of different parts of the sun, Herschel thought that the non-luminous atmosphere reflects a little less than half the light that comes from the luminating atmosphere, and the solid body of the sun from one-tenth. He also supposed that the presence of spots and other disturbances indicated a large formation of heat light and in the sun, and was a diagnostic of hot weather and fine seasons. This he imagined he had verified by such comparisons as existed of the state of the sun at different times with the prices of wheat immediately following: he found that, as far as his data went (and he gives a proper warning as to their insufficiency), the price of wheat always rose when the sun was without spots, and fell when they began to reappear. We have not heard of any extensive attempt to verify or refute this theory; but so far as the hypothesis of the two atmospheres is concerned, it is one of high probability: we could hardly ask for a likely result of such a combination, which does not actually make its appearance. If it be correct, the sun may very possibly be a globe habitable by living beings, perpetually illuminated by its upper atmosphere, the lower atmosphere preventing too much of either light or heat from reaching them.

But as to the process by which this enormous manufacture is kept up, no theory gives the means of forming even a conjecture on the subject. Not but that conjectures have been formed: for example, it has been thought that comets carried supplies of the necessary material. That comets may occasionally fall into the sun is very possible; but as far as our knowledge of them goes, it would be as reasonable to expect that the steam-engines in our factories should be kept in repair by throwing their own cinders upon them, as that comets should supply what is needful for the maintenance of the solar rays.

SUNDIAL. Up to a comparatively recent period the science of constructing sundials, under the name of Gnomo- nomics, was an important part of a mathematical course. As long as watches were scarce, and clocks not very common, the dial, which is now only a toy, was in actual use as a timekeeper. Of the mathematical works of the seventeenth century which are found on book-stalls, none are so common as those on dialing. All that is now necessary is to give some idea of the principles on which such instruments are constructed, as an illustration of a leading fact in astronomy. If a person were to place a staff in the north, and the dial, which is another plate of metal, horizontal or not, on which are marked the directions of the shadow for the several hours, their halves and quarters, and sometimes smaller subdivisions. In the accompanying diagram, the style is seen, having so thrown its shadow between the directions marked IX and X, on the western side, and indicating that it is about a quarter past nine in the morning. But there is one prominent part of the figure which is never seen on a dial, namely, the hour circles, which are represented as all passing through the edge of the style. As the diagram stands, a skeleton globe of hour-circles only is made a part of the construction, to assist in the explanation.

Let us suppose the sun to move with an equable motion, so that it shows the same time as the clock. It does not so in reality, but the consideration of this point belongs to the article Timex. A large sundial is frequently furnished with a table of the correction of sun-time, to turn it into clock-time, engraved on its face; but this is generally soon corrected. Nor is knowledge of the simplest element of astronomy so widely diffused as to make such a table of any great use. A person who stations himself in any place of resort which has a sundial, will soon find a loungier who looks in amuse-
resist the melancholy conclusion that his watch has gained or lost a quarter of an hour in a ten minutes' walk. Neglecting the cause of this, which is an irregularity of solar time, and has nothing to do with any particular mode of reading the results, I found that it varied during the morning, and during the afternoon, and during the evening, and during the night. This means that the sun is in that hour-circle which belongs to three hours before noon, or is $3 \times 15$ or 45 degrees from the meridian hour-circle towards the east. The meridian hour-circle is that which cuts the plane of the sun at the time the line XII XII; and the hour-circle in question (the right-hand one of the two which are not shaded) cuts the dial-plate in IX IX. Now when the sun is in the continuation of any plane, the shadow of that plane is only that of the edge presented to the sun. The use of the names continues for all the hour-circles and its shadow is therefore, for the time, part of that of the hour-circle in which the sun is. Hence at nine o'clock before noon the line OIX will be the shadow of the style, Q being at the intersection of the edge of the style and the dial-plate (marked by a large dot in the figure). In the diagram, the day has moved on about a quarter of an hour after the time just described, and the shadow has advanced accordingly. There is in it a trifling error of shading (it was made in 1824), a very neat trigonometry, a work which is very rich in well-drawn solid figures, which will serve to illustrate the subject. The time being between nine and ten o'clock, the sun ought to be looking directly into the crevice between the hour-circles IX and IX, in which crevice there should be no shadow; but the crevice which is entirely devoid of shadow is that between the hour-circles VIII and IX, so that the sun is made to tell one story on the north side, and another on the south, of the figure. The reader will easily set this right, and will see that as far as the whole theory is concerned, the sun is not required to be made to answer the purpose of a sundial.

Though the preceding figure was drawn for a horizontal dial, yet any other plane might be substituted. The objection is that the shadow of a sphere sufficiently well defined to give very accurate results, even for ordinary purposes: that refraction, which always makes the sun appear a little too high, throws the shadow a trifle towards noon at all times, that is, makes the time too fast in the morning and too slow in the evening; and that a correction is always necessary in order to find mean or civil time. Even if the first objection could be got over, the corrections requisite for the two latter would prevent persons in general from making use of the instrument. If the edge of the style be drawn with a very narrow pole, a work which morning and evening halves of the dial separated by the breadth of that edge.

Those who understand spherical trigonometry can see that the general problem of a sundial consists in that of finding out where the hour-lines cut a given circle, as follows. Let BQC be the circle in which the plane of the dial produced cuts the heavens, and let the angle CAS, which it makes with the horizon (A), and CBN, which makes with the meridian (m), be given. From P, the pole, draw QP perpendicular to the plane of the dial; and then join P with C, being the centre of the continuation of the style, that is, the point with Q is the continuation of what is called the sub-style. Now in the right-angled triangle ABN, we have

\[
\cos NB = \frac{\cos A}{\sin m},
\]

whence NB is found; to which add the latitude of the place, PN, and PH is found. The equations

\[
\tan PB = \tan m = \tan sin CB, \quad \sin m = \sin PQ
\]

show how to place the sub-style with respect to B, the point answering to noon; and also how to place the style with respect to the sub-style. To find the point V at which any given hour-line, PV, cuts the circle CB, first find the angle QPB from

\[
\cot QPB = \tan m, \quad \cos PB, \quad \sin m = \sin PQ
\]

and VPB, the hour-angle from noon of the sun (V being a point in the shadow). The difference of these angles, QVP, or their sum, is then known; and QV is found from

\[
\tan QV = \tan QPV \cdot \sin PQ.
\]

It will be better for the beginner to verify these steps on a correctly-drawn figure, or to modify them, than to make purely graphical alterations. Also it is to be remembered that the position of the dial may require both sides of it to be graduated, and the style to extend in both directions, to include all its latitude. The sun's face, at any one of the days when

SUN, ECLIPSE OF THE. The phenomena of an eclipse of the sun resemble those of the moon in one respect only, namely, that the body of the luminaries disappears. In all other respects there is so great a difference, both in magnitude and duration, that it is not possible to speak of them as similar. The eclipse of the sun is a very rare phenomenon, and its duration, even when it reaches its greatest extent, is so short and so variable, that it is a pity one term, eclipse, should be used in senses so different. In the first place, the disappearance of the moon arises from the earth intercepting the light which it should receive, while that of the sun is the consequence of the earth being in the same line of the sun as its moon, and the body of the moon is not absolutely hidden, and is even slightly visible through a telescope during the darkest eclipse: but the body of the sun is really hidden by the intervention of the opaque substance of the moon. Again, the phenomena of an eclipse of the moon are the same for every point of the earth at which they are visible: the beginning, middle, and end of the phenomenon happen at the same instant of absolute time everywhere, and the same portions of the moon are hidden, and at the same instant. But in a solar eclipse, it entirely depends upon the position of the spectator whether there is any eclipse at all; and of two persons at different parts of the earth, at the same instant, one may see the sun totally eclipsed, the other none at all. Therefore, for the first time, that all the parts of the sun may be visible, and the eclipse observable, and the eclipse answerable to its name, the sights of the sun's rays, not know that the moon is almost close to him. A screen held before a candle may be an eclipse of the candle for one person in the room, but not for another, on account of their difference of place; this is an illustration of the solar eclipse: all that is necessary to make the phenomenon visible is that one person in a room at the same time; this is the same illustration of a lunar eclipse.

If the earth had no motion of rotation, the inhabitants of any one place would see something exactly resembling a lunar eclipse; the whole sun would be hidden in a place in earth of the earth's shadow. But different places would see different kinds of eclipses, some losing more of the sun's body, and others less. The rotation of the earth, without material change in the evening, explains these phenomena, makes it much more difficult to calculate: for it is as if each spot of the earth, instead of standing still to witness one phenomenon, or one simple eclipse, were constantly taking into view portions of different phenomena, a part of the sun's line of shadow being cut off by the moon.

If an eclipse of the sun, the beginning at two different places does not happen at the same instant; the inhabitants of any one circle see very different phases, and a line drawn through all the places which see the same sort of phase under the same position of the luminaries with respect to their horizons will be very different from a circle. Thus, attempting to give any account of the modes of ascertaining these points, we subjoin, from the Nautical Almanac, a projection of the eclipse which is to take place on the 7th of next July, the southern line passes through all the places which see a simple contact of the luminaries and nothing more: the edges of the luminaries unite for a moment and then separate. This line touches the two ends of a large figure and divided by another line passing through its loop, and the portion of the earth which at that time see the eclipse is contained in the broad shaded band. On the line marked 'beginning of eclipse at sunrise' live those to whom the luminaries rise in contact: the other lines are similarly marked.
of the eclipse at sunrise: this means that the eclipse's there only a contact, so that its beginning, middle, and end take place at the same moment, and that moment is sunrise. At the loop of the figure of eight, the beginning, middle, and end are represented as each of them taking place both at sunrise and sunset: which must be a mystery to those who are not used to trace mathematical conceptions to their limits: are there two eclipses, one for sunrise and one for sunset? The explanation is this: there is at every moment of time a point in the arctic regions at which the sun is making its first appearance or its last appearance previously or subsequent to the long polar day or night. As this moment approaches the days shorten, if the disappearance be coming on, and begin from nothing if the appearance be coming on: the long day or night being preceded by the ordinary day or nights of the rest of the earth. Now the point which is at the loop is that point of the earth at which the sun and moon are in contact (without any further eclipse) at the moment when the sun first grazes their horizon after their polar night: so that their day is but a moment, and at that moment the contact takes place.

The figure of the projection is not always like that of the preceding: sometimes the loops become two ovals separated by a line which is continued through the middle of them, the part of this line between the ovals being a line on which nothing but a simple contact is seen.

There is an excellent mathematical account of eclipses in general, with the full mode of calculating them, and examples, by Mr. Woolhouse, in the Supplement to the Nautical Almanac for 1836. From this we extract the summary of the limits within which an eclipse, whether of the sun or moon, can happen.

At the time of full moon an eclipse of the moon will be certain when the moon's latitude is less than $31° 57′$, impossible when it is greater than $63° 45′$, and doubtful between these limits. For the doubtful cases an eclipse will result when the moon's latitude is less than

\[ p + x - s + \frac{16′}{45} \]

$p$ and $s$ being the equatorial horizontal parallax and semi-diameter of the moon, and $x$ and $s$ those of the sun.

At the time of new moon an eclipse of the sun will be certain when the moon's latitude is less than $1° 23′ 16″$, impossible when it is greater than $1° 32′ 52″$, and doubtful between these limits. For the doubtful cases, an eclipse will happen when the moon's latitude is less than

\[ p + x + s + \frac{16″}{25} \]
Cinnyridce.

It is hardly necessary to state that eclipses of the sun are frequently wholly partial, that is, not total for any one moment to any one part of the earth. Sometimes, though the eclipse be central, it is not total on account of the moon not being near enough to hide the whole of the sun: in which case part of the latter is seen as a bright ring round the part hidden by the moon, and the eclipse is annular.

An appearance of a surprising character has been often observed in total and annular eclipses of the sun, as soon as the moon begins to leave or approach the internal border of the sun. In the former, the edge of the sun is not always instantaneous, but threads of black appear to connect the edge of the moon and sun, as if the edge of the moon were formed of some dark glutinous substance which its tenuity adhered to certain points of the sun's limb, and by the pressure of the moon was torn off into threads, which suddenly broke and wholly disappeared. . . .

The moon preserved its usual circular outline during its progress across the sun's disc, till its entire limb again approached the border of the sun, and the annulus was about to be dissolved. When, all at once (the limb of the moon being at some distance from the edge of the sun), a number of long, black, thick, parallel lines, exactly similar in appearance to the former ones above mentioned, suddenly durid forward from the moon and sun before the annulus was thus repeated, but in an inverse order. For, as these dark lines got shorter, the intervening bright parts assumed a more circular and irregular shape, and at length terminated in a fine curved line of light near the edges of the sun's disc, as if the sun's com was entirely vanished, and the annulus consequently became wholly dissolved. The preceding is from Mr. Bailey's paper on the solar eclipse of 1836 (Mem. Astron. Soc., vol. x.), in which an account will be found of preceding appearances of this description, which other observers saw the same things in the same eclipse. No account whatever can be given of the reason of this remarkable appearance.

SUN-BIRDS, Soui-mangos, Cinnyridie, a family of birds of brilliant coloration living in parts of the New World, and resembling in the Old World the Trochilidae, or Humming-Birds of the New Continent and its islands. Cuvier, in defining his genus Cinnyris, states that the species composing it have the tail no longer worn; the bill long and very slender, with the edge of the two mandibles finely serrate; and the tongue, which can be protruded from the bill, terminating in a fork. They are, he observes, small birds, the plumage of whose males glitters in the season of love with metallic colours, approaching in splendor that of the humming-birds, which so strongly resemble them in this respect in the Old Continent, where they are found principally in Africa and the Indian Archipelago. They live, he adds, on flowers, from which they pump the juices: their nature is gay, and their song agreeable. Their beauty makes them sparingly used after in the spring; the plumage of the females and that of the males during the interval between the seasons of love is entirely different from its nuptial brilliancy, it is difficult to characterize the species. (Uigene Anima.)

Cinnyris, in Cuvier's arrangement, stands between Meliphagidx and Arachnothera.

Mr. Vigors considers the Tenuirostre, or Suctorial birds, the most interesting group, perhaps, of the animal world. "Deriving," says that author, "their subsistence for the most part from the nectar of flowers, we never fail to associate them in idea with that more beautiful and perfect part of the vegetable creation, with which, in their delicacy and fragility of form, their variety and brilliancy of hues, not less than the splendor of their liquid diet, has led to the comparison of them to flowers; and, as the juices, they appear to have so many relations. As the tribe is confined exclusively to the torrid zone and the southern hemisphere, the naturalists of our northern latitude have had little opportunity of observing them in the act of inspecting their internal constructions. Much confusion has consequently arisen in assigning them their respective stations, more particularly among the Honeysuckers of New Holland, which have been indiscriminately scattered among various families. The bill is singular, in that it is long and perfect information which alone can authorise us to decide upon the station of any bird in nature, I cannot, at present, undertake to fill up the details of this tribe with much pretension to accuracy. The following sketch however of the Suctorials families will, I imagine, be found to afford some approach, in its general outline, to the natural divisions into which the tribe branches out, and to the order in which they succeed each other:---Nectarinidae, Cinnyridie, Trochilidae, Promeropidae, Meliphagidae. Arranged according to their typical characters, they thus succeed each other:---

Normal Group. Bils of and feet comparatively slender (graciliorius). . . . {Cinnyridie. Trochilidae.}

Abrrent Group. Bils and feet comparatively strong (forbitorius). . . . {Promeropidae, Melipagidae, Nectarinidae.}

Mr. Vigors then proceeds to state that Illiger was the first who separated the true Certhia of this tribe into the two groups of the Lienean Certhia, which feed upon vegetable juices, and which he therefore distinguished by the generic name of Nectarinia. This latter genus, observes Mr. Vigors, comprising two distinct and strongly marked groups, has again been separated by Cuvier into two divisions: the first of which, consisting of birds whose bills are shorter and stronger than those of the second, and whose feet are also in general more robust, he has retained the name of Nectarinidae. The second contains those species in which the bills are longer and more attenuated, and the legs and feet are proportionally more delicate, by the appellation of Cinnyridie. The two first families in the arrangement of Mr. Vigors accord with these views; and he remarks, that, on the formation of these species, the seasons of the year may be separated by their geographical limits. The Nectarinidae, as far as Mr. Vigors can trace out their extent, are confined to the New World; while the Cinnyridie are circumscribed within the bounds of the antient continent and its adjoining islands. Between the two orders the separation is complete, the tribe, Mr. Vigors remarks that the Nectarinidae appear to hold, by the comparative strength of their feet and bill, an intermediate position between the Cresent and the typical groups of the Honeysuckers. Cinnyrites, he observes, the feet in climbing, the Nectarinidae hop from flower to flower, seeking the nectar of each; while the Cinnyridie and Trochilidae make no use whatever of the foot as they extract their food, but during the process of feeding are posed entirely upon the wing. The two last-mentioned families, he adds, again approach each other in the slenderness of their bill, the vividness and changeable lustre of their plumage, and the habit of hovering on the wing when they feed. They are chiefly separated by the structure of their bill, which in the Cinnyridie, but the geographical distribution of the two families points out a line of demarcation. Mr. Vigors concludes this part of his observations by acknowledging that these two typical families are the only groups in the tribe of birds which claim the attention of the ornithologist; and that these two families form the subject of this article. (Natural Affinities that Connect the Orders and Families of Birds, in Linn. Trans., vol. xiv.)

Swinhoe considers the Cinnyridie, or Sun-birds, so called by the natives of Asia in allusion to their splendid and shining plumage, the subtypical family of the Tenuirostre. He observes that the affinity is obvious between this family and the Meliphagidae; but whether the direct passage is made by the short-billed honesuckers (Dissceps, Cuv.) or by the spider-suckers (Arachnothera, Temm.) is uncertain. "The plumage of the meliaphagous birds of New Holland," says Mr. Swannin, "is almost universally dull, or at least destitute of those gay and beautiful tints which are so strikingly marked in the species of the Cinnyridie and the Megalaimidae, green, variegated on the under parts with steel-blue, purple, bright orange, or vivid crimson, decorates nearly all the species, and produces a brilliancy of colours only rivalled by those of the humming-birds. The bill is very long, slender, and acutely pointed, the margins being dentated in the most regular and delicate manner: yet the teeth are so small as scarcely to be seen by the naked eye; the tongue is formed into a solid tube, or, rather, as we suspect, into two bands, one of which is thicker than the other. There is no opening of the honey-suckers, which always ends in a brush: the bill also is never notched. The difference between the two structures is softened down by the intervention of the nectar-birds (Nectarinia, Ill.), whose bill shows a union of both characters, the margins being finely dentated, and the tip distinctly notched. The species of the latter are few; and
while Cinnyris is restricted to the tropics of the Old World. Nectarinia represents them in the New. Some few other forms, found in Australia and in the Oceanic Islands, belong to this group, and they are arranged in the genera Melithreptes and Dicrurus, but their habits are imperfectly understood.

The genera arranged by Mr. Swainson under the family Cinnyridae are Melithreptes, Cinnyris, Anthreptes, Nectarinia, and Dicrurus. The family stands between the Meliphagidae and the Troglichider. (Classification of Birds.) Mr. G. R. Gray makes the Nectarinia, as he writes the word, the second family of the tribe Tetraonitres, placing it between the Upupidae and the Trochilidae.

The Nectarinidae in his arrangement comprise the following subfamilies and genera:—

Subfam. 1. Nectarininae.


Certhiola, Sundev. (Parnarius, Steph.; Nectarinia (Ill.); Less; Certhia, Linn.). Dacnis, Cuv. (Certhia, Linn.). Unciotrurus, Lath. and D'Ory.

Upon the whole we take the arrangement of Mr. Swainson. The following cut is after his figures in the Classification of Birds.

Bills of Cinnyridae.


Family Character of Cinnyridae. —Wings with the outermost quills more or less shortened or graduated. Bill more or less curved, generally entire. Nostrils short, oval, membranous, opening by a lateral slit. Feet moderate. Bill entire. (Sw.)

Genera.

Melithreptes, Vieill. Bill long, sickle-shaped; the sides considerably compressed; the culms elevated, and the tips entire. Nostrils very short, opening by a semicircular slit. Tongue long; the tip only terminated by a bunch of short filaments. Wings moderate; the third quills nearly equal. Feet robust, long. Lateral toes equal. Tarsus almost twice as long as the hind toe. Pacific Islands. (Sw.)

Example, Melithreptes Pacificus. Cinnyris, Cuv. Bill long, slender; the tips very acute and entire; the margins minutely dentulated; base of the upper mandible folding over, and partly concealing that of the lower. Nostrils short, oval. Tongue retractive, simply forked. First quill spurious, second shorter than the third. Tail even or rounded. India and Africa. (Sw.)

Example, Cinnyris chalybea.

Description.—Golden green, with brown wings and tail, and narrow pectoral red band bordered above by another of steel blue; upper tail-covers blue.

This, according to Mr. Swainson, is Certhia chalybea, Lin., Gmel.; Le Souit-manga à collier, Vieill., and Coloured creeper, Lath.

Mr. Swainson remarks that another bird very nearly resembling this has been figured by Le Vaillant under the name of Le Sueur à plastron rouge ('Oise. d'Afri.,' pl. 300), but that Le Vaillant's reasons for separating them are, he thinks, sufficient, at least until more forcible ones are adduced than mere conjecture.

Anatreptes, Sw. Bill moderate, rather strong, slightly curved; widening towards the base, which is much broader than it is high. Base of the under mandible thickened, and not partially covered by the upper. Wings, feet, and tail as in Cinnyris. (Sw.)

Example, Anthreptes Javanica; Nectarinia Javanica, Horst.

Description.—Glossy metallic purple above, olive yellow beneath; scapulars, rump, and rather broad lateral stripe extending from the corner of the bill to the breast with a slight curvature, glossy violet; the throat chestnut; tail black.

Mr. Swainson describes this bird as a Cinnyris in the 'Zoological Illustrations,' and by the name here adopted in his 'Classification of Birds.' These changes however leave his declaration that it is not a Nectarinia (a genus confined to the New World) untouched.

Antreptes Javanica. (Sw., Zoö. III.)

Nectarinia, Ill. Bill in general shorter than the head, wide at the base, compressed from the nostrils. Tip of the upper mandible with a distinct notch; the margins entire. Wings long; the three first quills nearly equal. Lateral toes unequal. South America only. (Sw.)

Example, Nectarinia cyanoccephala.

Description.—(Male.—Changeable blue; throat, back, tail, and wings black; the quills edged with blue.—Female green; head, checks, and scapulas bluish; throat grey. (Sw.)

This, according to Mr. Swainson, is (Male) Motacilla Cayenna, Linn. Gmel.; Sylvia Cayenna, Lath.; Petit bleu de Cayenne; Briss.; Cayenne Warbler, Lath.; and Sylvia Cayennensis cerulea, Briss. (Female) Motacilla cyanoccephala, Gmel.; Sylvia cyanoccephala, Gmel.; Sylvia viridis, and Le Petit verd, Briss; Blue-headed Warbler, and Blue-headed Creeper. Lath.

Mr. Swainson states that the habits of this bird...
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footly the same as those of the rest of the *Nectarinia*. 'It
is,' he says, 'one of the commonest birds of Brazil, and
appears spread over the whole extent of that country.
It frequents the same trees as the humming-birds, hopping
from flower to flower, and extracting the nectar from each;
but this is not done on the wing, because its formation
is obviously different from the humming-birds, which, on
the contrary, poise themselves in the air during feeding.'
This is the passage alluded to and quoted by Mr. Vigors
(see p. 284).

Mr. Swainson remarks that the young males, as usual
before molting, have the colours of the female, and that
the rich sky-blue of the male, in some lights, becomes
greenish, and in others dark-blue.

*Nectarinia cyanospilus*. (See, Zoo. Ill.)

Upper figure, female; lower, male.

*Dicseum*, Cav. Bill short, remarkably broad at the base,
and suddenly compressed beyond; the tips entire; the mar-
gins minutely dentilicated; nostrils triangular. Wings,
feet, and tail as in *Nectarinia*. Indian and Australian
Islands. (Sw.)

The figure referred to by Cuvier gives an incorrect notion
of this genus [Canavera], and there must be some mistake;
but the reader will find a most elegant and characteristic
drawing of *Dicseum hirsutum* in Mr. Gould's grand
work of the 'Birds of Australia.'

Mr. Gould states that the *Scolloio Dicoseum* has neither
the habits of the Pardalotes nor of the Honey-eaters; it
differs, he says, from the former in its quick, darting flight,
and from the latter in its less prying, clinging, and creeping
actions among the leaves, &c. 'When perched on a
branch,' continues Mr. Gould, 'it sits more upright, and is
more swallow-like in its contour than either of the forms
alluded to: the structure of its nest and the mode of its
nidification are also very dissimilar. Its song is a very
animated and long-continued strain, but is uttered so in-
variably that it is almost necessary to stand beneath the
tree upon which the bird is perched before its notes can be
heard. Its beautiful purse-like nest is composed of the
white cotton-like substance found in the seed-vessels of
many plants; and, among other trees, is sometimes appended
on a small branch of a *Casuarina* or an *Acacia pendula*.

It was on the latter tree that I found a nest containing
three or four young: a second nest, with the eggs, was
given to me in Sydney. The ground-colour of the egg is
with very minute spots of brown scattered over

the surface: they are nine lines long, by five and a half
lines broad. The Male has the head, all the upper surface,

wings, and tail black; throat, breast, and under tail-coverts
scarlet; flanks dusky; abdomen white, with a broad patch
of black down the centre; irides dark-brown; bill blackish-
brown; feet brown. The Female is dull-black above,

glossed with steel-blue on the wings and tail; throat and

centre of the abdomen buff; flanks light-brown; under
tail-coverts a pale scarlet.'

Locality.—The Australian continent, generally.

SUN-Fish. A fish so named on account of its almost
circular form and shining surface. This most remarkable

fish belongs to the family Gymnomodidae, and genus *Or-
thogorius*. As in others of the family, the sun-fishes have
the jaws provided with an ivory-like substance, divided

internally into lamellae, which represent the teeth, these
being united as it were into a solid mass. The opercula are small,

and the branchiostegous rays are five in number; the body
is compressed; the pectoral fins are of moderate size; the
dorsal and anal fins, both of which are long, are united with
the caudal, and thus surround the hinder portion of the

fish, which appears as if it had been truncated. The short

sun-fish (*Orthogorius mola*, Schneider) has been found on

various parts of the British coast; when however observed in
our seas, they have generally, Mr. Yarrell remarks,

seemed as though dead or dying, and floating along on the

side, presenting the broad surface of the body to view. 'Dr.

Neill says, of one that was brought to him, the fishmen

informed him that, when they observed it, it was swimming

along sidways, with its back fin frequently moved. It

seemed to be a stupid, dull fish: it made little or no attempt
to escape, but allowed one of the sailors to put his hands

under it and lift it fairly into the boat. The sun-fish has

been generally mentioned as remarkable for its phospho-

rescence, but this specimen did not exhibit that phenomenon

so distinctly as a haddock or a herring.'

This fish is said to feed on sea-weeds: its body, viewed

sideways, presents nearly a circular figure; the jaws are

slightly produced; the eye is rather small, and the percu-

lar fin is small and rounded. Occasionally this species attains

the length of four feet, and weight of upwards of three

hundred pounds: the skin is very rough, and chiefly of

a silvery colour.

The ordinary sun-fish (*Orthogorius oblongus*, Schneider),

usually found at the Cape of Good Hope, is said also to

have occurred on the British coast. Dr.arton describes

the body of the oblong sun-fish as being nearly three times

as long as it is deep.

A third species of the present genus, of small size, is

sometimes met with in the Atlantic: it is the *Orthogorius
spinulos* of Bloch.

SUN-FLOWER, the English name of a genus of plants
called *Helianthus* from helios, the sun, and -anthos, a flower.

Two reasons have been assigned for giving the plants of

this genus this name: first, the resemblance of the large
disk and ray of their flowers to the sun; and second, the

tendency of these flowers, in a stronger degree than in any

other plant, to keep their heads turned towards the sun.

In this circumstance the French *tournesol*, Italian *girasole*

and *English tournesol* have been given. This is a genus consist-
ing of very stately herbaceous plants, and containing up-

wards of forty species, all of which are indigenous to Ame-

crica. It belongs to the natural order Composite, and has

the following characters: head composed of many flowers,

the flowers of the ray being ligulate and neuter, the flowers

of the disk tubular and hermaphroditic: involucres irregularly

imbibed, the outer scales foliaceous, the inner ones scaly;

rubber-like, oblong, or convex, sometimes united in rows;

the tube of the corolla of disoid flowers short, 5-toothed;

style appressed; fruit an achenium compressed lat-

erally; pappus in the form of two lanceolate acute decidu-

ous scales. The leaves are sometimes superiorly alternate,

and either entire or toothed. The whole plant is

scabrous or villos. The flowers are solitary, and of a yellow

or orange colour.

H. annus, annual sun-flower, is an herbaceous annual plant

with thick rough stems from 5 to 20 feet in height: leaves

alternate, petiolate, nearly heart-shaped, emarginate or

dentated, rough; the heads are large, from one to two feet

in diameter, and composed of a multitude of flowers of a beau-

tiful yellow colour, terminal, solitary, inclined, the disk

verti-
cal and alternate growing the south. This appearance is the

basis of the genus: it is indigenous in Mexico and Peru; it was

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early introduced into Europe after the discovery of America, and has since been very generally cultivated in gardens, on account of its very large and handsome yellow flowers. The plant however in Europe never attains the height nor the flowers the size they do in their native soil and climate. The elevation of 11° R. of the latitude runs with a large quantity of oil: and it has been proposed to cultivate it for the sake of obtaining this oil, which is very palatable, and might be used for the table. For this purpose the Society of Arts supplied forty plants, of which Dr. Royle, in his Travels to the gardens of Java on the south and that of Borneo on the north was formerly generally known by the name of the Sun Sea, but at present it is very frequently called the Java Sea. Properly speaking, the islands which enclose that sea were called the Sunda Islands, and then the term was only applied to the large islands of Java and Borneo, which lie south and north of it, and to those of Sumatra and Celebes, which enclose it on the west and east. Those four islands are still generally called the Sunda Islands; but as there was no general name for that chain of islands which extend from the eastern extremity of Java to the coast of New Guinea or Papua, the name of Sunda Islands was extended to them by geographers, and they go now under the same name. The lesser Sunda Islands consist of the term Sunda Islands the whole of the Indian Archipelago is comprehended, with the exception of the Moluccas, the Sooloo Archipelago, and the Philippines. The greater Sunda Islands, namely, Borneo, Celebes, Java, and Sumatra, with their dependencies, namely, Branc at Club, Billiton, and Madura, are noticed under separate heads.

**SUNDA ISLANDS, LESSER.** Situated between 8° and 11° S. lat., and between 114° and 135° E. long. They are the earliest inhabited of the East Indies. They were visited by whaling-vessels, and since the formation of a British colony on the north coast of Australia an active intercourse has been established between Port Essington and the eastern groups of the Lesser Sunda Islands; and it is probable that many and valuable objects have been received in the eyes of Europeans, and in a short time we shall become better acquainted with them. The Lesser Sunda Islands consist of four large groups, which, from west to east, are called the Timor Islands, the Serawaiate Islands, the Timapi group, and the Aroo Islands. The term Lesser Sunda Islands is frequently applied to the Timor Islands alone.

The **Timor group**, so called from the large size of the islands, extends from 114° to 137° 30′ E. long. It comprehends the greater part of the islands and the larger islands of the whole chain. Between 114° and 119° it consists of three large islands, Bally, Lombok, and Sumbawa, which lie west and east of one another. But between 119° and 127° the islands constitute a small, or oblong group, in the extreme northern, lying between 8° and 9° S. lat., comprehends Comodo, Flores, Solor and Adanara, Lombaen, Panitar, Onayab, and Wetter. The southern row forms a curve towards the south, advances nearly to the island of Sumba or Sandalawal, Savu, Rotti, Simao, and Timor. The strait which separates these islands from one another are often navigated by vessels bound to or from China, when they reach these seas in seasons during which the navigation through Sunda Strait is either dangerous or tedious. Lombok Strait, which separates Bally from Lombok, is more than 40 miles long, and at the southern extremity it
is divided into two channels by an island called Banditti Island.

At this part it is about 30 miles wide, but towards its northern extremity it narrows to about 12 miles. It is rarely navigated by vessels coming from the north, as a strong current generally sets through the strait from the south, and the northern coast is too shallow for the safe passage of it. But there are a few anchorage-places on each side of the strait where the current is weak, it is frequently used by vessels from the south.

The Strait of Alans, which extends between Lombock on the west and Sumbawa on the east, is more than 50 miles long, and about 12 miles wide on an average, but it narrows in some places to 7 miles. This strait is more used by vessels going to or returning from China through the sea between the Lesser Sundas; it is narrower and more dangerous than the Lesser Sunda Islands, because the current is very moderate, never exceeding two knots per hour, and though there are no soundings in the middle of the strait, anchorage is generally found along the shores of the island of Lombock.

The island of Sumbawa extends from west to east about 180 miles, but its width varies between 50 and 20 miles; two large bays, Sallee and Bima bays, enter deeply into the island from the north. The average width may be 40 miles, which gives an area of 7200 miles, or about 800 miles less than that of Wales. Along the southern shores of this large island extends a mountain-range, which begins on the shores of the Strait of Alans and terminates on that side of the island; Lombock, Bima and Sumbawa consist of two parallel ridges, rising one above the other to a great elevation. The middle of this chain, and opposite the Bay of Sallee, which cuts it nearly in two, is a deep depression in the range, which is not much above sea-level. The shores of this mountain-tract are high and steep. It is not known how much of the island is covered by these mountains.

The remainder of the island is generally hilly, but a few of the elevations rise considerably above the rest. The most remarkable of them is Tumbora Peak, a volcano, whose explosion in 1815 is one of the most terrible on record; the island suffered dreadfully; whole towns and villages were destroyed by the ashes, of which a vast mass was thrown out, and which were spread as far as Surabaya in Java, and to the islands of Macassar and Ambon. Its elevation above the sea, according to different estimates, is between 6000 and 9000 feet. The low and level tracts occupy only a comparatively small part of the island, and they generally occur at the innermost recesses of the bays along the northern coast, and along the Strait of Sapy. The Strait of Alans presents a high and rocky coast, which however towards the north is lined by many low rocky islands, between which the main body of the area is deep enough for vessels of considerable size, but it is not much navigated, owing to its rocky bottom. The soil of this island seems to be much inferior to that of Lombock or Bali, but it does not differ in vegetable productions, except that it is more typical of the tropical forest than of the dry savannah. Sumbawa has a large number of trees; in the vicinity of the sea however there are no large trees, which is owing to the great consumption for ship-building. The animals are also the same as in Bali, but buffaloes are very numerous, which are rather scarce in Bali. The horses of this island, especially those of Bima, are the finest breed in the whole Archipelago, and are extensively exported. These ponies—for they are never more than thirteen hands high—are well-proportioned, and bear a strong resemblance to the Arabic breed. Sumbawa seems to have minerals; at least gold is collected in some of the small rivers. Pearls are found in Sallee Bay. The island is divided into six petty states, Bima, Sanger, Tumbor, Pasukan, Papekat, Sumbawa, which do not always agree with one another, but are united together by a defensive alliance. The Dutch have established a kind of authority in the eastern districts; but the western states, Sumbawa and Bima, are independent. There is no commerce of this country, except that some intercourse exists between Bima and Java, and that the trading boats from Ceram and Celebes visit the port of Sumbawa. These seem to be the only places from which the produce of the island is exported.
from the sugar of the lontar-trees (Borassus flabelliferum). This sugar is also the only article of export, and is carried off by the Bugis. Their domestic animals are those of the other islands. The wild animals are hogs and deer, but they are not numerous. The inhabitants, about 5,000 in number, have frizzled hair, and resemble those of Timor. They are governed by four chiefs, who acknowledge the supremacy of the Dutch, who have an interpreter here. The only advantage which the Dutch derive from this island is for soldiers.

**Roti** extends from south-west to north-east about 60 miles, with an average width of 20 miles; its area is about 1,200 square miles, and 120 miles of their coast is fringed with low hills and narrow valleys; the soil is very stony, but productive. The rivers are few and small, and the supply of water generally scanty. Rice in small quantity, with Indian corn, millet, sweet potatoes, and cassava depends on the consumption of the inhabitants. In dry seasons they depend on the sugar of the lontar-trees. Cotton is grown, but not enough for consumption; some is imported from Celebes. The horses, or rather ponies, are better than those of Timor, but not equal to those of Java.

This gives an area of 12,500 square miles, or half the extent of Ireland. A chain of mountains runs through the middle of the island from one extremity to the other, and some of the summits attain such an elevation that the snow of the temperate zone clings to them. The river course of Tenerefe.

Along the south-west, the hill on which the town of Timor stands is generally low or slightly elevated, but at a short distance there are hills that rise in gentle declivities towards the mountains. On the northern coast the land descends from the hills to a low level, and falls down in many parts towards the sea. Though the greater part of the island consists of a succession of narrow valleys, hills or mountains with steep sides, there are a few large plains, of which one of the largest is at the bottom of Coopang Bay, which is more than 10 miles square. All the rivers are small, and descend so rapidly a declivity, that none of them are navigable beyond the tidal point; though the tide is nine feet at the full and change, it seldom ascends above 400 yards from the mouths of the rivers, and only in the rainy season does it give an entrance to the small harbours which are found along the coast. The soil in many places is fertile, but the greater part of the interior has not been visited by Europeans. In the plain of Bow-nor, Bow-nor, Coopang, the average depth of the land is upwards of seven miles. The principal industries of the island are rice, maize, and palm. Rice is of the finest quality; maize is much cultivated, owing to the hilly nature of the country. Maize is the principal article of food, but the produce is not equal to the consumption, for except in very plentiful seasons the inhabitants depend on sugar cane. Sugar-conservatism is a pastime among the people of Coopang. In some parts of the island a species of sago-palm is found, and used as food. Small quantities of sugar-cane are raised, but not for the purpose of making sugar. Coco-nuts and areca-palms are very scarce, and only among the hills and on the side of some of the low islands are they abundant. Jack fruit, oranges, lemons, etc. The domestic animals are horses, buffaloes, sheep, goats, dogs, and cats. The wild animals are buffaloes, deer, hogs, a species of large wild-cat, and one kind of monkey, all which are eaten by the natives, except the monkeys and hogs is found in several of the rivers both in lumps and in small particles, and some of the lumps weigh two ounces. But superstitious motives prevent the natives from collecting it. Native copper is said to abound in the primary hills, which are situated on the centre of the island's north-west side. The natives are of a very dark colour, with frizzled bushy hair, but they resemble the Papusas less than the natives of Timor. They are below the middle size, and rather slight in figure. In the extreme north are mountains, which rise to a great height, rather than any of the Malay tribes. Human sacrifices are made on certain occasions, but in the vicinity of Coopang they have been put down by the authority of the Dutch governor. The island is divided among many petty chiefs. It is supposed that they are all of the same origin. The Dutch are either dependent on the Dutch or on the Portuguese. The whole southern coast is considered to belong to the Dutch, but as there are no harbours, the Dutch have formed no establishments, and their authority is only nominal. The eastern part of the north coast, a far west opposite to Genoese, is under the authority of the Portuguese, but west of that place the possessions of the two nations are completely mixed.

Coopang is situated near the western extremity of the island, and is 12 miles long and upwards of 50 miles deep. It is formed by the island of Semao on the south-west and a projecting point of Timor on the north, and has excellent anchorage. In the easterly monsoon it is a safe harbour, but as it is open to the north-west monsoon it is not used during that quarter. Then however they find shelter either under a small island called Pulu Tekos, on the north side of the bay, or in the strait which divides the island of Semao from the main body of Timor. Fort Concordia, the principal settlement, is situated on the north side of the bay. The trade of this place is considerable, and is said to amount annually to rather more than 1,200,000 Spanish dollars. The principal articles of export are wax, sandalwood, earth-ool, and cattle. The cattle go chiefly to the island of Malacca, and some are exported to China. Some are exported to China, to Java, the Celebes, the Sunda Islands, and to the coast of the Malay Peninsula. The Portuguese have three settlements on the northern coast, Batoo-Gede, Dilli, and Manatoato. Dilli is the principal settlement; the harbour is open to all winds from west-north west to east-north east, but is perfectly defended from the south-west and south by a reef extending west-north-west from the island. This reef extends across it, leaving only a narrow passage at the north-west end, by which large ships enter the harbour. The town is rather populous, but meanly built, and the small houses of which it consists are rather disreputable than otherwise. The port is not deep, and seems not to be inferior to that of Coopang. The principal articles of export are slaves, wax, sandal-wood, benzoin, and ambergis, most of which are exported to Macao, except the slaves, which go to other islands of the Indian Archipelago, especially to Celebes. The imports are the same as at Coopang, with rather a greater proportion of Chinese goods.

To the north of Timor is the island of Wetter, which is about 36 miles long and 20 miles wide on an average of 1,300 square miles, or a little more than the extent of Wiltshire. It is a high rocky mass, but much less elevated than Timor. The Dutch had formerly a small establishment on the south coast at Saw. But at present the island is left to its own resources, except with those of Kisser, who fish wax, sandal-wood, rice, and maize, and give in return cotton-cloth, linen, and iron. The domestic animals are sheep, hogs, fowls, and buffaloes. The bulk of the population are Harakanos, but on the coast are some of the natives of Malay race.

The Sarawatish group, situated between 5° and 6° S. lat., and between 127° and 131° E. long., consists of two rows of islands, which extend between Timor and Wetter on the west and Timoratua on the east. Though the Dutch for some years have visited and traded with some of these islands, they were a few years ago so little known, that even in Hamilton's 'East India Gazettes' only two of the islands
are named, and none are described. Lateiy this group has been visited by Kolff, and some British vessels from Esing-
ton, which went there for provisions.

The southern series consists, besides several smaller
islands, of the greater number of any of inhabited, of seven
islands, of which, from west to east, are Kisser,
Lettu, Mau, Lakor, Locan, Serrantte or Serraswati, and
Baber or Babiti.

Kisser is about 18 miles in circumference, and the
surface is hilly; many of the clayey soils have a rugged
irregular appearance. In the valleys, which have a fer-
tile soil, and on the sides of many of the hills, rice is
grown, with the sugar-cane, yams, sweet potatoes, tobacco,
cotton, and many culinary vegetables, scarcely an available
space is left. It is said that there are more than 30,000
inhabitants, more than 1700 of whom are Christians
of the Dutch Protestant creed; about 500 of them are
descended from the Dutch, who formerly resided on the island.
Two dialects are spoken, which the women that indi-
viduals are often met with in the island who cannot under-
stand one another. The natives are of the middle size and
considerably well made; their colour is dark brown; the hair
is generally straight, but often slightly curled; and the fea-
tures are by no means ugly, as is usually the case with the
people of Troper Europe.

Leitu has been a favorite place of visit for Europeans, if it were not for the dark-
ness of their complexion. The descendants of the Dutch
are often as fair as Europeans. Though this island is well
provided with domestic animals, as buffaloes, cattle, pigs,
sheep, goats, etc., the greatest number of the inhabitants are
brought from the other islands, and there exchanged for
cotton-cloth, ammunition, glass, coarse cutlery, &c. The
island is the resort of traders from Celebes, Amboyna, and
Banda, and therefore an emporium for foreign goods, which
are obtained by the natives on the coasts of the island and
sent to the easternward. The inhabitants have many trading boats,
some of them 40 or 50 tons burden, with which, towards
the end of the dry season, they visit the other islands to dis-
spose of the produce of the rice they raise. The products
imported at Kisser are chiefly cottons, iron, earthenware,
musquets, gunpowder, spirits, brass, wire, cutlery,
and beads; the exports are tortoise-shell, bees-wax,
rice, cotton, native cloths, tobacco, sandal-wood, maize,
and live stock of all descriptions. The rice produced in this
island is considered one of the greatest quantities of cloth from the cotton produced
on the island, the greater portion of which is disposed of to the people of the neighbouring
islands. The yam is dyed before the cloth is manufactured. The coast of the island is
steep and rocky, but there are some small islands for boats
may lie at anchor, especially those of the garden variety.

At the western extremity, and on the south-east coast,
there is anchorage for larger vessels.

Lettu, which lies farther east, and is larger than Kisser,
is surrounded by the district of the East Indies, which has
half a mile wide. This island is mountainous, but surrounded by a lower tract,
which is at a short distance from the shores rises into
hills, on which the villages are built. In productions it does not differ from Kisser, but it is much less populous, and not so thickly settled. The latitude of this island is
visited to the Protestant creed by the Dutch. Mau is per-
haps twice as large as Kisser. It has good anchorage on
the east side. The surface is level, except that there is
a high mountain, called Karban, at its north-eastern end.
This peak resembles that of Teneriffe, but is not so high.
Cultivation is very limited, the greatest part of the island
being used as pasture for buffaloes, cattle, sheep, goats,
and pigs. There are no horses on this island, nor on any other
cos of Timor. In this island the inhabitants have embraced
Christianity. Mau is the last island on which the Christian
religion has made any progress: most of those who have
become Christians have learned to read and write. Lakor
consists of coral rocks, is low and level, and only covered
with a thin layer of that of Teneriffe, but is not so high.
Cultivation is very limited; only small quantities of maize, yams,
and sugar-cane are grown, and these are only kept, and not
kept, and there are only a few buffaloes. The population is small.
Kolff found only two Christians among them. Locan is
submerged by submarine reefs; there are several small
islands on the reefs, which are uninhabited, but cultivated.
Locan is the westernmost of the Lesser Sunda Islands, where
that kind of holoburia from which the trepang is
obtained is found abundantly and of excellent quality. The
trepang-banks are near the reefs which surround the islands.
All these articles are exported to Banda, Amboyna, and Ce-
lebes, whence they are brought to Europe, and some important
articles are obtained. Kisser calls it, Serraswati, and
never visits by Europeans, because no anchorage is found near it. It contains
perhaps 2000 inhabitants, of whom about 800 are Christians.
Inlets are numerous at sea. It is not said not to be well inhabited: it
produces rice, maize, yams, &c., which, with some domestic
animals, are brought to Locan for coarse cloth and a few
other articles. The most eastern of the southern islands is
Baberi, or as Earl calls it, Babiti. It is nearly 30 miles long, with an average width of 10 miles.

The surface is mountainous. It has good anchorage at the
western extremity, near the village of Tepa. The interior of the island is as
small and also the northern part is
All the villages are in the west and south-east districts. As
articles of cultivation, maize, yams, and cocoa-nut trees are
mentioned. The domestic animals found in the other islands are plentiful here, and in the uncultivated parts
of the island, which, is not much visited. Only once or twice annually
a coasting vessel from Banda comes to fetch the produce of
the island, especially animals, and brings in exchange
coconut-cloth and a few other articles.
The northeastern and western parts of the island contains,
besides a few smaller islands, four larger islands, Roma,
Damm, Nila, and Seroa. The three last mentioned con-	ain active volcanoes, which constitute the connecting link
between the volcanic islands of the Sunda coast and the
Malaccas. Roma is about 34 miles in circumference, and
has an anchorage on the south and another on the
north-west coast. The surface is a succession of hills and valleys.
The island is covered with trees, except on the south coast,
where there are more extensive cultivated and uncultivated areas
have made more progress in civilization than those of the other islands, except Kisser. Many of them can read and
write, and are Christians. The articles of export are wax,
sandal-wood, edible birds'-nests, and great quantities of
rice. The greatest part of the island is covered with trees,
the residue of which contains a large number of
resort of numerous turtles. Damm is mountainous, but
not very high, except the Peak of Damm, near the
north-east coast, which always emits smoke: at its base there are
some small settlements, and the land is very fertile, and the inhabitants live mainly on the produce of their
food, cattle, sheep, and sugar-cane, cultivating only a little maize, yams, and sweet pota-
toes. Game is very abundant, especially wild hogs and many kinds of birds. A few of the inhabitants are Chris-
tians. Nila is one of the larger islands, but is not
so much an island as a tract, which ascents from a deep sea. There is a volcano on the east side, and
on the north side an anchorage for small vessels. Its
productions for exportation are hogs, fowls, and cocoa-nut,
which are brought to Banda by the Islanders themselves.
Seroa, called Serra, by Kolff is likewise a mass of volcanic
rocks: in 1653 there was a terrible eruption, in which a part
of the mountain subsided, and a lake was formed filled
with burning matter. The population is small.

The Teminber Islands are situated between 7° 30' and
8° 30' S. latitude, and 100° 30' and 101° 30' E. longi-
and consist of one large island, Teminber, and three of moderate size, Corra, Larrat, and Verdeo, and a great number of smaller
islands, with which the seas along the north-west coast of
Timor are dotted. The channels by which these islands are divided from one another are not very
narrow for small prahaus: they contain numerous trepang-banks.
The larger of the Teminber Islands have only lately been
known. Teminber extends nearly 60 miles from
south to north, and is the broadest part of the island. We
know nothing of it, except that the surface is neither
undulating than hilly, and that it is surrounded either by
reefs or by mud-banks, which extend to a considerable
distance from the shores and render access impossible for large
vessels. The inhabitants are friendly to strangers, and
the crews of some European vessels who have been
colonized.
tious have been killed and the vessels destroyed. *Cerru,* which lies west of Timor-laut, is very populous. The inhabitants are the traders of this group of islands, and export their cattle, which however only seem to be found in Timor-laut, and other domestic animals and also top-sheep and trepang to Banda. *Lurrat,* a considerable island, to the north of Timor-laut, resembles it in surface. *Fordate,* north-east of Lurrat, contains lofty hills, and is described as very fertile, and rich in all the products of these islands, especially very populous. Sago-trees and coconut trees are abundant.

The inhabitants of the Tenimer Islands differ materially from those of the other groups. They are well made, and though they bear a strong resemblance to those of other islands, which have so little of the characteristics of the other nations which inhabit the Indian Archipelago, that they, like the inhabitants of Rotti, might be taken for Europeans, if their complexion was lighter. They have also attained a considerable degree of civilization, which may be inferred from their dwellings, which are from 20 to 30 feet long and from 12 to 15 feet wide, and divided into several rooms. They have vessels, about 30 feet long and from 10 to 12 feet wide, which are constructed with great skill, though without any iron. They may also great attention to the cultivation of the ground.

The most eastern group of the Lesser Sunda Islands are the *Arroo Islands,* which are situated between 2° 20' and 7° 5' S. lat. and between 31° and 32° E. long. When the account of their islands was collected by Dampier, it was found that no publication had not been derived from an eye-witness, but since that time the voyages of Kolff have been published, which contain much information respecting them. According to his most recent account, it seems that the largest island, which is called *Korow,* which is about 70 miles long and about 30 miles wide on an average, and two other considerable islands, Trama and Mykor, which lie west of Korbore, and are divided from it by a narrow strait. To the north of Korbore and Mykor are eight or ten islands, most of them of which are inhabited by Waken, and Waydjar are the most remarkable. All these islands are moderately elevated, and they have a slightly undulating surface: Kolff thinks that the base of these islands is isolated rocks, and that the intervals between those have been filled up by the sea. The chief of these which divide these islands from one another are narrow, and the tides in them are very irregular. The islands are not rich in productions. Cultivation is limited to the planting of sago-trees and of the raising of yams. Rice is imported from Java, and is the food of the people. The animals which inhabit these islands are goats, and fowls. Wild hogs are very numerous. The bird of paradise is found only here and on Papua, and the feathers are an article of export. The principal articles of export however are drawn from the sea, as the trade of the greater parts of these islands is confined to marine products. The fishing-boats are mostly situated to the east and south of the islands, and are very extensive. There is also an export of mother-of-pearl shells and of tortoise shells. The imports are coarse cotton of different colours, skins of many kinds, and in a word, all the necessaries of life. Kolff says that the inhabitants of Korow inhabit the southern islands of the Archipelago.

About two centuries ago the Dutch formed a commercial establishment on the island, and had for some time a military post. But though the trade was at first very lucrative, it soon yielded, and was probably, because they were overpowered with those articles which were in request among the people; and the Dutch company abandoned the islands entirely. During their stay, the Dutch had introduced Christianity, which still maintains its ground in the small but flourishing Christian community of a few families. The inhabitants of Wadser have embraced the Mohammedan creed, which has extended thus far south from the Moluccas, but the number of Mohammedans is small. There are no clergyman on the islands, but there are a few schoolmasters, pachers of Ambon, who instruct the people, read some parts of the bible and sing hymns with the congregation, which meet in small churches built by the Dutch. 

The majority of the inhabitants however are hotheads, and it is even pretended that they have no religion. They seem however very much inclined to become Christians, but hitherto no missionaries have been sent to them. The heathen are Hainamors, according to Kolff, and quite different from the Christian and Mohammedan inhabitants, as to whom he does not state if they belong to the pure Malay race or not.

*Inhabitants.*—The Lesser Sunda Islands are evidently inhabited by two or three, different races of men. Those which lie west of the *Strait of Amboyna,* seem to be of the Malay race; but further west the great bulk of the population has features materially different from the Malay, as is proved by their darker colour, their hirsut, and the hair and skull of the orang, or orang-outang, which the Malays are mixed with Hainamors and African negroes.

But the intermarriage between these two races seems to be doubtless, when the peculiar character of the natives of Cooksland or New South Wales, and of Van Diemen’s Land, is considered. From the latest accounts it appears that the inhabitants of the northern coast of Australia, though they differ little in stature and features from those of the southern parts, are of a different character, and much superior in intellectual powers, and that a few only of them have been given to christianism.

Information on this point will probably be collected at the new colony at Port Essington, when we shall be able to decide whether a mixture of the two races has taken place in these islands. The Hainamors who inhabit the Amboyna, or the Sunda Islands, are situated more in civilization than the natives of the southern coasts of Australia.

In the interior of the larger of the Lesser Sunda Islands, as Timor and Wetter, a race of Hainamors how little inferior to those of Amboyna. They exhibit more the character of the Southern Australian than that of the inhabitants of the Arroo Islands. Perhaps a third race of men is found on the Tenimer Islands and on Rotti, for the inhabitants are described as exhibiting little mixture with those which inhabit the Malay race, and as resembling more the Europeans than to any other people of Southern Asia. They seem also to speak a different language.

(Stavrovius’ Voyages to the East Indies; Harbough’s India Directory; Ralph’s History of Java; Crawford’s History of the Indian Archipelago; Moor’s Notices of the Indian Archipelago;亚洲的印度: 阿尔伯特的印度。)
Island has the form of a horse-shoe: it extends north and south 10 miles, and about 18 miles east and west along the northern side. Towards the west the island is level and low, but towards the east it is hilly: two of the hills near the eastern shore rise to a considerable elevation, and serve as beacons. Near the whole island is entered three miles coast, and is only inhabited by some fishermen. The Great Channel, between Prince's Island and Crockatoa, is about 20 miles wide; and although without soundings or anchorage, it is much frequented, being the widest part of the route, and is frequented from danger. The island of Crockatoa, extending north-west and south-east about 6 or 7 miles, and 4 or 5 in breadth, rises with a steep ascent on all sides, and has a peak at its southern extremity, which rises 100 feet; and so as to from the 5th Mark in entering the Strait of Sunda from the westward. It does not appear to be inhabited. The channel between Crockatoa and Tamarid Island is about 10 miles wide; and as it has regular soundings from 18 to 28 fathoms (mud), where ships can occasionally anchor, it is often preferred to the Great Channel, particularly by ships working out against the westerly monsoon. Tamarid Island, or Pulo Bessy, is nearly as large as Crockatoa; and also contains a high peak rising 100 feet. The channel between Tamarid Island and Pulo Sebookoo is only 6 or 7 miles wide, and though free from danger, it is not much frequented. Pulo Sebookoo is somewhat less than Tamarid Island; but also high, and covered with wood. The channel between this island and Bassa Island is about 8 miles wide, and is frequently navigated by vessels returning from China, as it offers a more speedy voyage during the north-western monsoon, and as Bassa Road is an excellent place for procuring good water and provisions.

Near the centre of the eastern end more narrow portion of the strait is the island called Thwart-the-Way, which is more than four miles long from south to north, and moderately elevated, but surrounded by a sea inconveniently deep for anchoring. The channel between this island and Sundar Island is called Bsudo Channel, and is frequented in the north-west monsoon by ships from the China Sea bound westward. At other seasons the preference is given to the southern channel, between Thwart-the-Way and the coast of Java, which is called Baudom Channel. Both passages are free from any danger, except near the shores of Java and Sumatra, where there are some islands and rocky shoals. The tides in this narrow part of Sunda Strait seem to be greatly influenced by the winds, and frequently resemble currents more than regular tides. The strongest current occurs in Zutphen Channel, in February and March, when it runs from 4 to 4½ miles an hour to the west-south-west, and requires great caution on the part of the navigator, especially in the vicinity of Hog Point, the most southern cape of Java Barrier. At other times it runs less than 3 miles an hour, or less. In Bantam Channel, and near the island of Thwart-the-Way, its velocity varies between 2 and 3½ miles an hour; but near the coast of Java, only from 1 to 2½ miles an hour, generally last 12 hours, and is strong; whilst the tide-tide, which sets to the north-east, is moderate, except during the strength of the north-east monsoon.

Though this strait is the maritime high-road which connects the most populous and civilised countries of the globe, there is no town on its shores, not even a large village, though there are several places which afford safe and convenient anchorage. The most important and most frequented is Raja Bassa Road, on the eastern side of Lombok Bay, which extends from the Day in Java to the straits of Melaka (Stavrovec's Voyages to the East Indies; and Horsburgh's India Directory.)

SUNDAY, the first day of the week. [Week.] Besides the name of Sunday (des solis), it was called by the early Christians ' the Lord's day' (A ίηώθα γνωριζότα) dominicus, or simply express, dominico from its being the day on which the resurrection of Christ took place; and it was kept sacred in commemoration of that event. (San- ders, Book ii. p. 65.) In the first ages it appears to have been kept in the most religious manner, and on the observance of the first Sunday there is not any certain time, or definite number of days, prescribed in scripture to be kept as holy-days, but the ap- pointment of them is left to the church, to be assigned in any manner it shall please to her, and which every church has been pleased to appoint within their dioceses thereof. (It is said to have been debated at Genes whether the Reformers, for the purpose of estranging themselves more completely from the Romish church, should not adopt Thursday as the Christian Sabbath.) The we- ek was divided into seven parts in early days. For this purpose they were accustomed to assemble before daybreak; and we may infer from passages in the Acts, Epistles, and in Phiny's celebrated Letter to Troyan, that singing hymns, reading the Scriptures, prayer, preaching, and the celebration of the Lord's supper, formed parts of these services. We have a few notices of the mode of keeping the Sun- day during the first three centuries. As early as the end of the second century, abstinence from worldly business seems to have been customary. (Tertullian, De Ora., c. 23.) It was accounted a day of rejoicing, a feast and not a fast, and before the public exercises. It was observed by many. Upon it the Christians prayed standing, instead of kneeling, to intimate the elevation of their hopes through their Lord's resurrection. The public worship of the Christians on the Sunday in the first two centuries is described by Justin Martyr (Apolog.), whose account is particularly interesting, and by Tertullian (Apolog., c. 39; compare Euseb., Hist. Ecc., ii., 3, and iv. 23.) As soon as the Christian religion came to be recognised by the state, laws were enacted for the observance of the Sun- day. Constantine (in 321) when declaring it all pro- ceedings in the courts of law, except the manumission of slaves, and of all other business except agricultural labour, which was allowed in cases of necessity (Cod. Justin., iii., tit. 2, § 2; Cod. Theodos., viii., tit. 6, § 3, and, as Euse- bius tells us (Vit. Constant., vi.) in remembrance of the public exercises on Sunday. The laws of Constantine were repeated by subsequent emperors, with additions, of which one of the most important is that of Theodosius ii. (in 425), which enacted, that all Christians, whether in the city or in the country, shall observe the 1st of Sunday. (Cod. Theodos., xv., tit. 7, § 1, 5.) The most strict of these laws is that of Leo and Anthemius. (460, Cod. Justin., iii., tit. 12, § 8.) It should be observed that the provi- sions of most of these laws extend to all the principal sacred days observed by the Church.

In all Christian communities the Sunday has been ob- served with more or less strictness, the degrees of which seem to depend on three different views which are held respecting its character. Some regard all the provisions of the law, and as the resumption of the day to which, however an exception in the case of ' works of necessity and mercy;' others agree with these in abstaining from worldly business and amusements, because they think that only thus can the mind be fitted for the religious services which are observed on this day; while others, on the day of rejoicing, a Christian festival, devote a part of the day to religious worship, and the remainder to recreation. To these views ought to be added a fourth, which, though never thus can the mind be fitted for the religious services which are observed on this day; while others, on the day of rejoicing, a Christian festival, devote a part of the day to religious worship, and the remainder to recreation. To these views ought to be added a fourth, which, though never...
year, shall be kept holy days; but it provides that in harvest, or any other time when necessity shall require, any kind of work may be done upon those days. No penalty is attached to the infringement of this act. It is said to have been drawn up under the inspection of Cranmer. By 1 Eliz. 2, all persons having no lawful or reasonable excuse to be absent, are to resort to their accustomed parish church or chapel on Sundays, or to forfeit twelve pence, which was reduced to sixpence in 1538. The act was so enforced as to make amenable to ecclesiastical censure, but is only liable to one punishment, be it ecclesiastical or civil. Soon after this time the Puritans and other strict religonists attained political influence. Heylin, in his answer to Burton (1638), says that in about forty years before, and that in none of the fathers, nor the early authorities of the church, can anything of the kind be found. They appear to have entertained a greater pro- duction for the history and economy of the Jews, as con- tained in the Old Testament, than had hitherto been ex- hibited in the Christian world. Borrowing its phraseology, they styled and considered themselves God's people, while they bestowed upon their enemies the title of Egyptians and Amalekites. At the same time the City of London, a term which they thought profane, as derived from Saxon idolatry, the 'Sabbath,' or 'The Lord's Day,' names which are not used in the statutes previous to that period. In accordance with this mode of thinking, they seem to have been the only persons against the old observances, as re- served in the same manner as the Jewish Sabbath. It was with a view to counteract such opinions, that, in 1618, James I. wrote his 'Book of Sports,' in which he declares that dancing, archery, leaping, vaulting, May-games, Whit- sons, and other -- means of diversion,--were lawful, and that no such honest mirth or recrea- tion should be forbidden to his subjects on Sundays after evening service. He says the prohibition of them led to filthy tipping and drunkenness. Before his time the prac- tice of football and games of ball had been stopped by various acts of parliament; and butts were directed to be set up for that purpose, at which the parishioners were to shoot after divine service. James however restrains Popish recusants from playing football on Sundays; and from of it from the unattending church, and commands each parish to use such recreations by itself, and prohibits all unlawful games, such as bear-baiting, bull-baiting, interludes, and bowling by the meaner sort. The 'Book of Sports' was re-published by Charles I. in 1638. (3 Harley Miscellany, 77.) The Purit- ans however becoming the stronger party, their opinions prevailed, and there followed a rapid succession of enact- ments in furtherance of them. The 1 Ch. L. c. 1. enacts that there shall be no concourse of people out of their own parishes for any sports or pastimes, and that no unlawful games, such as bear-baiting, &c., shall be held in any parishes, under a penalty of 3s. 4d. for each offence. The 3 Ch. L. c. 1. enacts that no one with a horse or horsecarriage, cart, wain, or nor drover, shall travel on the Lord's day, under a penalty of 20s.; and prohibits butchers from killing on that day. But the most important statute on the subject is 29 Ch. II. c. 7, which enacts (sect. 1) that no tradesman, artificer, workman, labourer, or other person, whatsoever, shall do or exercise any worldly labour or busi- ness or work of their ordinary callings on the Lord's day (works of necessity and charity only excepted); and it prohibits the sale and hawking of wares and goods. Sect. 2 prohibits drovers, hunters, waggoneers and drivers of carriages, and their servants from travelling, and the use of boats, wherries, lighters, or barges, except on extraordinary occasions. By sect. 3 the dressing of meat in families, the dressing and selling it in inns, cook-shops, or victualling- houses, is for forty days only after Easter, excepted from the operation of the act. By sect. 6 persons are prohibited from serving or executing any process, war- rant, &c. (except in cases of treason, felony, or breach of the peace) on the holy day; and the taking of bail for the person serving it is made liable to damages, as if he had acted without any writ, &c. By the 10 and 11 W. III. c. 34, mackerel are permitted to be sold before and after divine service on Sundays, and forty weeks afterwards. No plates are permitted at public houses. The 21 Geo. III. c. 49, enacts that no house, &c. shall be open for any public entertainment or amuse- ment, or for publicly debating on any subject, on Sun- days. The 7 and 8 Geo. III. c. 75, repeals that part of 29 Ch. II. which relates to travelling by water. By 34 Geo. III., c. 61, bakers are enabled, between nine and one on Sunday, to bake for persons things which are brought to their oven. By 1 and 2 W. IV., c. 22, drivers of hackney-car- rriages may ply, and are compellable to drive on Sundays. By 2 W. IV. 15, commands the court of aldermen, or two justices, to regulate the route of stage carriage, &c. on Sundays. These two statutes relate to London only. The 3 and 4 W. IV., c. 31, provides that the election of corpo- rate officers, &c., required to be held on any particular day, shall be determined in the same manner as provided for in the act specified in the act happens to be a Sunday.

Under these enactments the courts have determined that a contract or sale which, though made on Sunday, is not in the exercise of the ordinary calling of the parties, is valid. Thus a contract of hiring between a farmer and a labourer, and a bill of exchange drawn on a Sunday, have been held to be good. The owner of a stage-coach is not included within the provisions of any of the statutes on the subject of Sunday in any manner whatever, in 29 Ch. II., being restricted in application to persons of the same classes as those enumerated by name. An action therefore may be maintained against him for neglecting to take a passen- ger. Only one offence can be committed by the same person whatever, in 29 Ch. II., and 31 Geo., c. 7, by exer- cising his ordinary calling on a Sunday.

(Com. Dig. tit. 'Temp.' B. 3; Burn's Justice, tit. 'Sun- day'; Heylin's History of the Sabbath; D'Irāelī's Ob. on James I.)

SUNDAY SCHOOLS. [SCHOOLS.]

SUDBERNS.

[SUDBURG.

[HINDESTAN, p. 217.]

SUNDERLAND, a parliamentary borough, partly in the east division of Chester ward, but chiefly in the northern division of Easington ward; the county of Durham; 367½ miles from the General Post Office. It is besides the nearest town by railway to Warrington, 191 miles; and from thence to Manchester, 191 miles; Normanton, 50 miles; York, 234 miles; Darlington, 443 miles; and Stockton, 12 miles; in all 3404 miles by railway, and for 57 miles by coach to Sunderland. The distance by the coach-road through Barnet, Baldock, Alineburn, Stanford, Newark, Doncaster, Bridgborough, Thirsk, and Stockton is only about 269 miles.

The parliamentary borough of Sunderland comprehends the parish of Sunderland; the townships of Bishop Wear- mouth and Bishop Wearmouth Parson, on the south side of the river Wear, in Easington ward; and the townships of Monk Wearmouth, Monk Wearmouth South, and South- with, on the north side of the river; 33 miles; and Chester ward. The area of the borough is estimated at 3040 acres (Report of the Commissioners of the Boundaries of Municipal Corpora- tions), or 5215 acres, according to the statement given in the Population Returns; with a population, in 1831, of 40,735, thus distributed: 5215 5135 192 82 104 40,735

Northern or Monk Wearmouth was a place of some note in the Anglo-Saxon and Anglo-Norman period. A monas- terery was founded here in the year 764; and it is probable there had been a previous monastic foundation here, but of short duration. The mound in the ancient churchyard by the Danes in the ninth century. The site remained desolate above two hundred years, till after the Norman conquest, when it was restored, but was soon after reduced to be a cell of the monastery of St. Cuthbert, Durham. The revenues of the monks were destroyed by the Danes in the first notice of South or Bishop Wearmouth is a charter of Hugh Pudsey, bishop of Durham, towards the close of the twelfth century, recognising a borough in the parish, and granting privileges to the burgesses similar to those of the borough of Wearcume; it is the latter form in the charter. Waremume (Wearmouth), but it appears from its very origin to have had also the name of Sunderland.
Towards the close of the reign of Elizabeth the shipping of coal began, and the town of Sunderland increased considerably. In A.D. 1634 it received a new charter of incorporation from Bishop Morton. In the year of the war of Charles I. it was garrisoned for the parliament, and several smart skirmishes were fought near it.

The parish of Sunderland, which was formed in 1719 by detaching a part of Bishop Wearmouth, occupies the point of land at the south side of the mouth of the Wear, with the exception of the town-moor or common of 70 acres, is covered with houses, all of them of considerable age. There is one street, broad and handsome, communicating with the High Street of Bishop Wearmouth, and lined with good houses: the other streets are nearly narrow lanes, so densely peopled as to be dirty, and, apparently at least, unhealthy. Bishop Wearmouth was some time since a distinct town from Sunderland, but the progress of building has united them: the High Street of Wearmouth and of Sunderland form one line extending above a mile in length from north-north-east to south-south-west. The newer part of the town adjoining Sunderland has good streets and excellent houses: the wealthier classes reside here. Bishop Wearmouth is rapidly increasing; several new streets have been recently built, or are in course of building. The principal streets in Sunderland and Bishop Wearmouth are paved and lighted. Bishop Wearmouth Pans comprehends a small but densely peopled part along the bank of the river: it has glass-houses and iron-works for the manufacture of articles required by the shipping. Monk Wearmouth Shore is immediately opposite to Sunderland and a part of Bishop Wearmouth: it has a dense population, but few of the higher class. Monk Wearmouth is by far the meanest of all the suburbs of Wearmouth, but lies back from the river. On the bank of the river, half a mile higher than Monk Wearmouth, and extending inland, is Southwick; and opposite Southwick, in the township of Bishop Wearmouth, is the hamlet of Deptford, which is from a quarter to half a mile distant from Bishop Wearmouth town.

The river is crossed by an iron bridge of one arch, erected near the close of the last century. The abutments are piers of nearly solid masonry, twenty-four feet in thickness, fortytwo feet in length, and thirty-six feet in height; the arch is of iron, and forms the segment of a large circle, having a span of 236 feet; the height above low-water is 60 feet to the spring and 94 feet to the centre of the arch, so that ships of 300 tons pass under it very readily by lowering their top-gallant masts. The superstructure is of timber planked over, with flagged foot-paths and iron balustrades.

The cost of this bridge was as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Est.</strong></td>
<td>£73 10 s. 10 d.</td>
</tr>
<tr>
<td><strong>Consulting architects</strong></td>
<td>605 7 s. 6 d.</td>
</tr>
</tbody>
</table>
| **Purchase of ground and houses**| 1,231 5 11  
| **Labour, floats, boats, &c.**   | 13,861 3 9   |
| **Interest of capital during building** | -27,408 7 10 |
| **Purchase of Sunderland Ferry** | 6,300 0 0    |
| **Purchase of Pump Ferry**       | 1,090 0 0    |
| **Law expenses thereon**         | 953 0 5     |
| **Total amount**                 | 61,800 0 0   |

Above the bridge, on the Bishop Wearmouth side, are very extensive straths for emptying coal, belonging to the trustees of the late counties of Durham and the Helton Coal Company; and on the opposite side other straths, belonging to Messrs. Pemberton and Co. Their pit is distant only a few hundred yards from the deepest part of the English channel, being a 200 fathoms below the surface. A little way higher up are the bottle-works of Ayre's Quay. The local straths of the Durham and Sunderland Railway Company are situated on the lowest reach of the river, on the Sunderland side. The banks of the river on the north side of the town are thickly covered with houses, and being connected with other railways in the southern part of the county, it has also a considerable traffic in goods and passengers. A wet-dock, containing an area of nearly eight acres, with a tidal basin attached to it of about one acre, has been lately constructed by a private company on the low ground between Monk Wearmouth Shore and the sea, on the northern side of the river, and near the entrance to the harbour. An opening has been made through the North Rigg to communicate with the river. A branch railway from the dock joins the Brandling Junction Railway, which is about 2 miles distant, and thus a communication is established between the Irish Sea and the German Ocean.

Sunderland church is a spacious brick building, erected in 1819 by Mrs. Stepney, the daughter of the late Mr. Cleasby, who bought the name of the county town from the Duke of Northumberland. There is an episcopal chapel, erected in 1789, near the east end of the town-moor; and a new church has been erected within the last few years with the aid of the parliamentary commissioners. The church of Bishop Wearmouth was very much altered in the early part of the present century, the chancel is antient, and has a fine east window divided into five lights with traceries. There are three episcopal chapels in the parish: one of these is at Ryhope, not in the borough of Sunderland; the others are within the borough. Monk Wearmouth church is a multistaled and irregular building, but has, especially in the tower, some antient features.

There is an episcopal chapel in Monk Wearmouth parish. There are a considerable number of dissenting places of worship.

There are a custom-house, an excise-office, and an exchange: the last is a neat building, erected nearly thirty years since, and comprises a merchants' walk, commercial room, news-room, auction-mart, and justice-room. On the west side of the town there is a clerk of the customs, a poor-house, and a police-station; and on the town-moor there are a theatre and an assembly-room. There are also baths adjoining the town-moor, and at Hendon, a little way south of the town, where bathing-machines are much used in the season. There are a commodious and spacious market, in which whear-works, and gasworks are carried on. An odd cemetery has lately been formed in a deep ravine contiguous to the town of Bishop Wearmouth, called the Rector's Gill. There has been lately erected in Bishop Wearmouth an theatre, the largest in the county, containing a large hall, with lecture theatre, museum, library, and other conveniences for literary and scientific purposes. It cost about 5000/.

The preservation and improvement of the port and harbour of Sunderland are entrusted to the fourteen commissioners who have been appointed under successive acts of parliament for levy certain duties and applying them to the cleansing and improving of the harbour. Of late years the amount of these dues averages annually about 16,000/. The warehouses, and particularly the quays, piers on both sides of the mouth of the river, have had so great an effect in improving the port, that ships drawing from 15 to 18 feet of water can now enter and depart from the harbour with great safety. The building of the south pier was one of the first operations on this plan. It was commenced in 1723, and was extended in various lengths from time to time. In 1746 it was 833 yards long and 30 feet broad, built entirely of stone. The north pier was commenced in 1726 with timber or earthenwork, but a length of 700 feet of this pier was afterwards built with masonry upon piles. In the beginning of this century both piers were very considerably extended; but being executed in a superficial manner, they soon showed signs of decay, and it was concluded to rebuild the eastern or seaward portion of both of them. In 1821 that celebrated engineer the late Mr. Rennie recommended certain lines to be adopted; and 230 yards of the south pier was built under the superintendence of Mr. Mitton, then engineer of the Company, in a very substantial manner with ashlar masonry in blocks of stone varying from 5 to 7 tons in weight. This wall was properly backed with rubble-stone. The top of this portion of the pier is 10 feet above high-water mark, and is united to the adjoining town by a causeway. A handsome arched bridge is the only passage over the wall to the town, built entirely of stone.
ten years in course of being rebuilt, under the direction of Mr. Murray, the present engineer to the commissioners, nearly in the same manner as the south pier just described, and the works are now rapidly drawing to a conclusion. The length of the north pier from its western to its eastern head is 590 yards. Near the termination of the north pier, in the year 1802, there was built an elegant octagonal lighthouse of poliBed stone, 62 feet in height from the cornice to the surface of the pier, which is here 12 feet above high-water of ordinary spring tides, with a broad and convenient cascade of water, making a total height of 78 feet. Its breadth at the base was 15 feet, and 9 feet at the cornice. It was lighted with coal-gas from nine patent burners with parabolic reflectors. This lighthouse stood in the direct line of the new pier, and will be the centre of the basin when the town and rebuilt it in a proper situation. But in the beginning of 1841 an alarming breach took place in the old pier, contiguous to the site of the lighthouse, which made it imperative for the town to build a coal-iron pier in an expensive manner. Mr. Murray, the engineer, suggested to the commissioners the removal of it in an entire state to the eastern extremity of the new pier, a distance of nearly 150 yards. In April, 1841, the Board decided that he should commence operations. On the 15th of June the masons began to cut holes for the reception of a cradle, or platform of timber, which was threaded through the building bark after bark. This cradle was supported upon bearers with about 250 wheels of cast-iron of 6 inches diameter, and its eight sides were supported with timber braces from the cradle upwards to the cornice. On the 2nd and 3rd July the whole were executed to 25 inches in a north-easterly direction to the new pier: it then took till the 30th of August to shore up the timbers and change the direction of the rails to carry it to the eastward. On the 4th of October it was finally brought to its destination in the centre of the broad pier, and the timbers have been since removed, and the masonry under-set with solid stone and pozzolana mortar. There is not the slightest appearance of a crack in any part of the building. The top was exhibited nightly during the operation of removal. The gross building weight was 20,000 tons. This was effected by three winches fixed upon the pier a little way in front of the building, and these were connected with the cradle above mentioned by ropes passing through twofold and threefold sheaves. Ten men each winch were employed to carry the building forward when it was required. The total sum expended on this work was 627l. The original cost of the building, in 1802, was upwards of 1400l. Mr. Murray has, since the completion of the undertaking, made a mechanical computation of the hours he spent in his exertions, and a piece"of statement of the value of 100l. has been presented to him as a further acknowledgment of his services on that occasion.

The principal manufactures of Sunderland are of bottle and flint glass. Anchors, chain-cables and other iron goods for ships, and cordage. Ship-building is carried on to a greater extent than in any other seaport of the British empire. Upwards of 300 ships of various burthen were launched during the year 1859. Pigot's Directory for 1854 enumerates about a hundred and thirty firms engaged in business in connection with this branch of industry, as ship-builders, boat-builders, chain-cable manufacturers, sail-cloth manufacturers, anchor and ship smiths, rope, sail and用人 goods, hemp and hemp-seed, fisher-mills, tan-yards, and brewers. The town is however more important from its commerce than its manufactures. In shipping coal it is exceeded only by the port of Newcastle, and lately perhaps by Stockton. The state of the coast-trade in 1839-9 was as follows:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1839</td>
<td>948,429</td>
<td>931,900</td>
</tr>
<tr>
<td>1849</td>
<td>308,168</td>
<td>379,620</td>
</tr>
</tbody>
</table>

The export of lime is another principal branch of trade: also the export of glass and grindstones. The imports are timber and iron from the Baltic; butter, cheese, and flour from Holland: and a variety of goods brought coastwise. A considerable fishery is carried on. The number of registered vessels belonging to the port in 1832 was 728, their tonnage 129,309; the number of men composing their crews 5738. There are six banking establishments. The market, formerly held on Friday, is now on Saturday; there is also a cattle-market, and there are two yearly fairs.

The living of Sunderland is a rectory, united with the chapel of the Episcopal chapel: the joint clear yearly value is 3562., with a glebe-house. The living of Bishop Wearmouth is a rectory (to which one of the Episcopal chapels is attached), of the clear yearly value of 295l. Bishop Wearmouth is in the rural deanery of Chester; Sunderland and Bishop Wearmouth in the rural deanery of Easington; all are in the archdeaconry and diocese of Durham.

Sunderland was made a Parliamentary borough by the Reform Act; and its boundaries (given above) were determined by the Boundary Act. It returns two members, and the number of voters on the register, in 1835-6, was 1484: in 1839-40, 1657.

The corporation of Sunderland has gone nearly into disuse at the time of the Municipal Reform Act: the corporation was composed of the Mayor, 12 Aldermen, and 24 Councillors; they had no jurisdiction or municipal authority: they held the town-moor and some other property of little account: the paving, lighting, watching, and cleaning of the streets were the work of two elected officials. By the Municipal Reform Act, the parliamentary boundaries were enlarged for those of the municipal borough, which was to have a commission of the peace, and to be divided into seven wards, with 14 aldermen and 42 councillors. The Commissioners charged in the Bills of Costs, 2727l. was recommended a more contracted boundary, and a division into six wards instead of seven.

There were in the borough, in 1834, one infant and one dame-school, with 136 children (37 boys and 79 girls); ninety-seven day-schools of all sorts, with 4243 children (2846 boys and 1752 girls, and 36 children of sex not stated); two of the day-schools were also Sunday schools, and were attended on Sunday by 505 children (301 boys and 204 girls). There were also twenty-five Sunday-schools, with 3367 children, namely 1617 boys and 1750 girls. There were an auxiliary Bible society, a ladies' church missionary association, a religious tract society, an infirmary, a dispensary, numerous almshouses, and friendly and benefit societies, and the following subjoined. There is no subscription library, society, news-rooms, a law library and a Wesleyan library.

Two weekly newspapers are published at Sunderland.

(Surtée's Hist. of Durham: Parliamentary Papers.)

SUNDERLAND, HENRY SPENCER, FIRST EARL OF Sunderland, eldest son of Henry, second Baron Spencer of Wornleighton, which title he inherited on his father's death in December, 1630. While still a minor he married the beautiful lady Dorothy Sydney, daughter of the earl of Leicester, and sister of Algernon, the 16th earl. He was born in London in 1617, and was educated at Christ Church, Oxford, and in the French schools of Paris. He was an auxiliary Bible society, a ladies' church missionary association, a religious tract society, an infirmary, a dispensary, numerous almshouses, and friendly and benefit societies. There is no subscription library, society, news-rooms, a law library and a Wesleyan library. Two weekly newspapers are published at Sunderland.
of honour, I would not continue here an hour. The dis-
ccontent that I and other honest men receive daily is beyond expression. Very much of the discontent here spoken of seems to have arisen from the influence in the royal councils pos-
sessed by Lord Sunderland, who, being near the support of the
queen. Lord Spencer, however, although he did not accept any military commission, drew his sword with the rest, and distinguished himself by his gallantry when the two armies joined battle for the first time at Edgehill, 23rd October, and there fought some time with much heat and
sacrifice of life. He was raised (it has been said, as a reward for accommodating the
king with the loan of 15,000l.) to the title of Earl of Sunder-
land, a title which had become extinct about three
years before by the death of Sir Thomas of Sunderland (per-
sonal estate), upon whom Charles had conferred it in the 
begning of his reign. But on the 19th of September
thereafter, the new-made earl fell at the (first) battle of
Newbury, the same fatal fight which deprived the king of the
earl of Pembroke, and Gloucester's, say Lord Falkland.
The royalist historian describes the Earl of
Sunderland as 'a lord of great fortune, tender years (being
not above three and twenty years of age), and an early
judgment; who, having no command in the army, attended
upon the king's person under the obligation of honour:
and, putting himself that day in the king's troop a vol-
unteer, before they came to charge was taken away by a
cannon bullet.' By his wife, who afterwards married
Robert Smythe, Esq., he left a son, who succeeded him in
the same estate. He had another son, Charles, II.'s famous ministre, the first marquis of Halif
ax, and another daughter, Penelope, who died unmarried.

SUNDERLAND, ROBERT SPENCER, SECOND
Barony. Son of Robert Spencer, earl, who was
diedly born in 1641 or 1642. His first entrance into public
life appears to have been in 1671, in the latter end of which
year he was appointed ambassador to Spain. In 1672 he
got to Paris in the same capacity, and he was one of the
three plenipotentiaries appointed. To proceed to Cologne
the following year, when England and France were engaged in
a war with the Emperor, Spain, and Holland, to open
negotiations for a general peace, which however proved
abortive. He had already evinced a remarkable talent in the
administration of business, and a great readiness in the
management of affairs, and a most superior genius and
capacity for business, which made him almost indispensable; in part to his equally un
rivalled skill in the art of insinuation, a skill moreover which he practised with the greatest advantage of being utterly un
noted and unknown to those whose business it was to
observe him. He was nominated in 1680, Marquis of
Halifax, in the room of Lord Clarendon, and appointed
secretary of state, president of the council, and premier
minister. And again, on the 12th of May, 1687—Lord
Sunderland, being lord president and secretary of state,
was made knight of the garter and prime favourite.
On the death of Clarendon, he was called and made secretary of state in the room of Sir Joseph
Williamson. From this time at least, if not from an earlier date, Sunderland especially attached himself to the
duchess of Portsmouth, availing of her patronage or instru-
mentality as one of the principal props of his ambition.
At first he and Lord Essex and Halifax united in opposing
Shafesbury on the question of excluding the duke of York,
and, keeping the chief direction of the state in their hands, the duchess of Portsmouth, the chief mistresse of the
duchess of Portsmouth, whose enmy and vengeance he
had incurred by being detected in making love at the
same time to herself and her daughter, Sunderland was sent
ambassador to France; but on the change of government
and ministry, the duchess of Portsmouth was removed
from his secretarial office, and he was removed from the
room of Sir Joseph Williamson. From this time at least, if not from an earlier date, Sunderland especially attached himself to the
duchess of Portsmouth, availing of her patronage or instru-
mentality as one of the principal props of his ambition. At first he and Lord Essex and Halifax united in opposing
a hotter Protestantism than ever. The princess (afterwards queen) Anne writes to her sister the princess of Orange, 13th March, 1668: 'This worthy lord does not go publicly to masques, but bears it privately at a priest's chinner, and never lets anybody be there but a servant of his. His lady too is as extraordinary in her kind: for she is a flattering, dissembling, false woman; but she has so cunning and endearing a way that she will deceive anybody at first, and it is said she is the greatest that ever was a woman's; but, as she cares not at what rate she lives, but never pays anybody. She will cheat, though it be for a little. Then she has had her gallants, though maybe not so many as some ladies here have;' under more dissembling and more affectionate church woman: so that to outward appearance one would take her for a saint, and, to hear her talk, you would think she was a very good Protestant; but she is as much one as the other; for it is certain that her lord 'does nothing without her.' And as a love to the duke, I must add my letter without telling you that Roger's wife (i.e. Lady Sunderland) plays the hypocrite more than ever: for she goes to St. Martin's morning and afternoon because there are not people enough to see her at Whitehall chapel, and is half an hour before other people come, and half an hour after everybody is gone, at her private devotions. She runs from church to church after the famous preachers, and keeps such a clatter with her devotions that it really turns one's stomach. Such is the house that she draws to and her good husband; for as she is throughout in all her actions the greatest jade that ever was, so is he the subtlest working villain that is on the face of the earth.' (Dalrymple's Memoirs, Append., i., pp. 320, 321, 323.) 

There was a great deal of much more trust and confidence in my letter without telling you that Roger's wife (i.e. Lady Sunderland) plays the hypocrite more than ever: for she goes to St. Martin's morning and afternoon because there are not people enough to see her at Whitehall chapel, and is half an hour before other people come, and half an hour after everybody is gone, at her private devotions. She runs from church to church after the famous preachers, and keeps such a clatter with her devotions that it really turns one's stomach. Such is the house that she draws to and her good husband; for as she is throughout in all her actions the greatest jade that ever was, so is he the subtlest working villain that is on the face of the earth.' (Diary, 18 July, 1668.) It is known now however that if Lady Sunderland professed to Evelyn to be opposed to the courses her husband pursued, she must have been imposing upon him; for she was certainly his confidant and associate in the darkest of his political intrigues and duplicities. As for Sunderland, one excuse that has been made on highly probable grounds for the worst things he did during his administration of affairs under James is that he was under the influence of the princess of Orange and doing his best to drive matters to a revolution. After the revolution, says Lord Dartmouth, 'he and his friends for pleased that he turned papist for the good of the Protestant religion;' and Burnet, in the passage to which reference is made, says that 'the Princess of Orange had since been imputed to his desire to gain the more credit, that so he might the more effectually ruin the king. James however at last either suspected him or thought to lighten the cery vessel of the state by throwing the unpopular minister overboard. He was dismissed on the 28th of October, 1688. 'This change,' says the 'History of the Desertion,' 'pleased all men, but it came too late.' Evelyn writes, under date of the 29th, 'Lady Sunderland is now become a great power, she has the seals from Lord Sunderland, and of her being with the queen to intercede for him. It is conceived that he had of late grown remiss in pursuing the interest of the Jesuitical counsels; some reported one thing, some another; but there is no doubt some secret betrayed which time may discover.'

On the arrival of the Prince of Orange, Sunderland went over to Amsterdam, whence he and his whole family, now the emperor, resided. He was under a perfectly false impression, that he had all along been in his interest. (See their Letters, in Dalrymple, Append., part ii., pp. 3-5.) On the 23rd of March, 1669, also, Sunderland published at London a defence of his conduct in the form of a letter to the Archbishop of Canterbury; it is printed (See that letter, pp. 28-33, and in Cogan's 'Tracts,' vol. iii. Here he professes, but does not support his assertions by any evidence, to have all along done his utmost, though unsuccessfully, to check James's illegal and headlong course, only taking blame to himself for consenting to remain in office when his advice was so entirely disregarded. The statement contains also some very thickly laid flattery of King William.

'Sometime after,' he says in one place, 'came the first news of the prince's designs, which were not then looked on as they have proved, nobody foreseeing the miseries he has done by his wonderful prudence, conduct, and courage; for he has displayed the most extraordinary, and has been at the greatest expense, in seven years and more, and perhaps ever, could not be effectually without virtues hardly to be imagined till seen nearer hand.' The conclusion of this precious effusion is rich:--'I lie,' says his lordship, 'for fortunes and afflictions extremely heavy, but I hope they have brought to me, in the occasion of them, the loose, negligent, unthinking life I have hitherto led, having been desperately hurried away from all good thoughts by pleasure, idleness, the vanity of the court, or by business; but I hope well to come over all the disorders my former life had brought upon me, and that I shall spend the remaining part of it in begging of Almighty God that he will please either to put an end to my sufferings or to give me strength to bear them; one of which he will certainly grant to such as rely on him, which I hope I do, with the submission that becomes a good Christian.' Sunderland, who had of course been excepted out of the act of indemnity, remained abroad about two years, but after that time, was among the surprises of the public, returned to be taken into favour by the revolution of the 24th of April, 1691. Evelyn writes: 'I visited the Earl and Countess of Sunderland, now come to kiss the king's hand, after his (the earl's) return from Holland. It is a mystery how he could escape from the public office, but it was well understood that he was nevertheless William's principal adviser. The admission of the Whigs to a share in the government, which took place in 1693, when Trenchard was made secretary of state and Sunderland secretary of war, was completely due to Burnet's influence. Burnet says, 'The bringing these men into those posts was ascribed chiefly to the great credit the Earl of Sunderland had gained with the king; he had now got into his confidence, and declared openly for the Whigs.' In the course of a prosperous day, the northerly wind, in November, 1695, his majesty spent seven or eight days at Sunderland's magnificent house at Althorpe, 'which,' says Burnet, 'was the first public mark of the high favour he was in.' On the 1st of December following, Evelyn notes, 'I dined at Lord Sunderland's (in Lincoln's), now the great favourite and underhand politician, but not adventuring in any character, being obnoxious to the people for having twice changed his religion.' Immediately after this he was made lord chamberlain, and by a stroke of that man whose actions had been so scandalous during his whole life, he never expected to return to the north of England. On the 23rd of March, his majesty gave the Earl of Dorset 10,000l. to resign in his favour; 'upon which,' he adds, 'Lord Norris fell very violently upon him in the House of Commons, as a man whose actions had been so scandalous during his whole life, to the advantage of the nation. It was never expected that he would use himself of another; therefore hoped they would address his majesty to remove him from his presence and councils, which, though not seconded, was universally well received.' In a note on the same passage of Burnet's History, Lord Hardwicke says, 'I have always been persuaded, from the signal confidence which King William reposed in this lord through the whole course of his reign, that he had received some particular services from him at the time of the Revolution which no one afterwards could have made out.' The usage of that day, Sunderland, as lord chamberlain, took his seat at the council-table; and he continued to direct affairs as the acknowledged head of the government for about two years longer. At last, in the end of the year 1697, he thought proper suddenly to quit his office, and to lead a private life. 'He was often named,' says Burnet, 'in the House of Commons with many severe reflections, for which there had been but too much occasion given during the two years Sunderland had been there; and his enemies, the Whigs were so jealous of him, that he, apprehending that, while the former would attack him, the others would defend him faintly, resolved to prevent a public affront to retire from the court and from business; not only against his enemies, but even against young prince, but every time that he would continue about him: indeed, upon this occasion his majesty expressed such a concern and value for him, that the jealousies were increased by the confidence.

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the court saw the king had in him. During the time of his critical contents had been carried on with more spirit and better success than before; he had gained such an ascendant over the king, that he brought him to agree to some things that few expected he would have yielded to; he managed the public affairs, in both his capacities, and so good a conduct, that he had procured to himself a greater measure of esteem than he had in any of the former parts of his life; and the feeblemess and disjointed state we fell into after he withdrew contributed not a little to establish the character which his administration had given him. A note of Speaker Onslow's upon this passage, which is too long to be extracted, records some curious particulars which show the panic precipitation with which Sunderland fled from what his fears represented to him as impending resuscitation. He had rather returned to court, but spent the remainder of his life at Althorpe, where he died on the 28th of September, 1709.

It is said that when Edmund Smith was applied to by Addison, at the instance of the Whig ministry of Queen Anne's time, to write the history of the Revolution, he started an objection to which no reply could be made, by asking, 'What shall I do with the character of Lord Sunderland?' The best thing perhaps that can be done in the case, is to allow the facts of his history to speak for themselves:--which they doajufficiently enough.

Lord Sunderland's wife was Anne, daughter of George Digby, second earl of Bristol. Pepys, speaking of Lord Bristol, under date of 1st July, 1663, says, 'I hear also of another difficulty new upon us, a marriage between Miss Digby, an elder daughter of that lord (who I do not know) so near to the marriage of his daughter, as that the wedding-clothes were made, and portion and everything agreed on and ready; and the other day he goes away; nobody yet knows whether, sending her home, the earl has no right or claim to her, and advice to his friends not to inquire into the reason of this doing, for he hath enough for it; and that he gives them liberty to say and think what they will of him, so they do not demand the reason, but rather living her, losing receipts for it. If this strange story be true, Sunderland would seem to have been at his manoeuvres and mysteries at a very early age, and long before he commenced his political career. There are numerous notices of Lady Sunderland in Evelyn's Diary. She seems to have taken pains to ingratiate herself with the good old man. Of the children of Lord and Lady Sunderland, the eldest son, Robert, died unmarried, in France, before his father, so that the title fell to the second son, Charles. Evelyn, who knew all the family well, speaks of him as particularly amiable; his only defect was his undue affection for his younger brother. Of several daughters, one, Elisabeth, was married to the earl of Clancarty in Ireland; another, the Lady Anne, described by Evelyn as 'a young lady of admirable accomplishments and virtue,' to James Lord Arran, the eldest son of the duke of Hamilton, who died in 1699, before her husband succeeded to the title.

SUNDERLAND, CHARLES SPENCER, THIRD EARL OF. The second son of Robert, second earl, was born in 1674. Evelyn mentions him in 1688 as 'a youth of extraordinary hopes, very learned for his age, and ingenious, and under a governor of great worth.' From Swift's History of the Last Four Years of Queen Anne, this governor or tutor appears to have been Dr. Trumell, afterwards Bishop of Winchester. He was returned to the House of Commons for Tiverton at the general election in 1695; and he sat for the same place in the three succeeding parliaments, which met in December, 1699, in February, 1701, and in December, 1701. The death of his father made him a peer about six months after the accession of Augustus. Before his marriage Lord Spencer, by the death but in his father's lifetime, member of the House of of Augustus, also the lone of his familiar friends, b done to myself, swear so than Charles Spencer, she should not be a peer in the lists of members any more: I am always called Earl. Afterwards however fallen from the height he which he began. His appointment as envoy to the court of Vienna in 1708, on the accession of the emperor Joseph. Some years before this he had married (for his second wife) a daughter of the duke of Marlborough; and this connection led to his being selected by the Whig section of the ministry to displace Sir Charles Hedges. When, in December, 1707, they found themselves about to force the queen to give them a person of their own politics as one of the tories of state, their opponent Harley still continuing to be the other, which he did however only for a few months. The history of this movement is told at great length by the ducesse of Bourbon and by Madame de Maintenon, who was intimately connected with it. Its result was to produce a completely Whig government, in which Sunderland retained his office of secretary till June, 1710, when his dismissal, without any reason being assigned, was the first intimation of the complete break-up of the ministry. As such an event was not to be foreseen, he never liked the notion of taking away a man's income, even when she wished to deprive him of power, offered to compensate Sunderland when thus turned off by a pension of an earl. A year. To this he replied, that it would give his majesty satisfaction he had done his duty; but if he could not have the honour to serve his country, he would not plunder it. He remained out of office for the rest of the reign; but the ability he had shown during the short time he was in it, and the popularity of the government at large, part of which continued to take in the debates of the House of Lords, made him be generally regarded as the head of the Whig party, and the man most likely to be placed at the head of affairs when the Hanoverian family should come to the throne. When the succession was by a charter in 1714, he was received with distinguished marks of regard by his majesty; such indeed as could not be omitted to one who had always been looked upon as the most devoted friend of the Hanoverian succession; but it had already excited some suspicion that he was not become the emissary of the lords justices to whom the government was committed on the death of the queen, and it soon appeared that there was another interest more powerful than his at the throne of Whores, namely that of his master Walpole, who had obtained the first place in the favour of Bothmer, the Hanoverian resident, and who, on his recommendation, was now appointed secretary of state, while Sunderland was obliged to put up with the lord-constancy and benignity. 'Though he did not openly show his disgust,' says Cox, 'yet he secretly took any active part in defending the measures of government. He, who was before accustomed to make a conspicuous figure in every debate, was now silent; he had no longer the same influence; and from the accession of George I. till the beginning of 1717 his name seldom occurs in the proceedings of the House of Lords.' It is probable that his relationship to the duke of Marlborough, who was personally disliked by the king, had something to do with this. He continued, however, in executive office, till August, 1716, soon after the death of the marquis of Wharton, he was made lord privy seal; but the place still gave him little or no share in the direction of affairs, and did not remove his disgust. Nordly he continued in the cabinet. On the contrary, he sought support for himself and the means of annoying and weakening his opponents, from all quarters. He 'increased his party,' says Cox, 'with a number of disaffected persons. He particularly gained among the Whig Carleton, Cavendish, Lennox, and Hampden; courted the Tories; entered into cabals against his colleagues; and was prepared to use all his efforts and employ any opportunities which might offer to prejudice the king against them.' His majesty had gone to Hanover in the latter part of July, 1716. 'One of the principal charges,' says Cox, 'which Stanhope had received from his friends in England was to be on his guard against the intrigues of Sunderland, who had, under pretense of ill health, obtained the king's commission to go to Antwerp, and at the time of his departure he had given the most positive assurances of repentance and conciliatory for his late endeavors to remove his colleagues, and, after the most solemn promises of friendship and a view of the advice for the regulation of his conduct at Hanover, to which place he intended to apply for leave to proceed, Townshend and Walpole suspected his sincerity; they had experienced his abilities; they knew his ambition; and they dreaded the ascendancy which he
might obtain through the channel of the Hanoverians, over the king. But they implicitly trusted in the sagacity and integrity of Stanhope, from whose acumen they were satisfied. Hanover, or, if he came, to counteract his views. Stanhope however did not follow their directions; for when Sunderland demanded access to the king, instead of opposing, he presented his resignation. He had, however, the assurance that Sunderland, who had arrived at Hanover on the 5th of October, soon acquired the complete confidence both of the king and of Stanhope. Lord Townshend, after much complicated manoeuvring and intrigue in which his own name was involved, and a long period of uncertainty, that so much depended on the personal conduct of his majesty himself, was removed; Sunderland was in the first instance appointed treasurer of Ireland for life, resigning his office of lord privy seal to the Duke of Kingston; and finally, in April, 1717, a complete reconstruction of the ministry was affected by the resignation of Walpole, Devonshire, Pulteney, and others of their friends, and by the appointment of Sunderland and his friend Addison as secretaries of state (the former also holding for some months the presidency of the council, which he eventually resigned to the Duke of Kingston), with Stanhope as first lord of the treasury and chancellor of the exchequer—an arrangement which about a year after was modified by Stanhope (now a peer) taking the office of prime minister. He was appointed to the place of first lord of the treasury, and to that of chancellor of the exchequer, which Aslalie had been deprived. Sunderland however still retained the most unbounded influence over the king; he even regulated the appointments to the highest offices in the state, taking the ministerial appointments against the united efforts of Townshend and Walpole. Coxe asserts, on the evidence of private papers, that he not only set his own head industriously to undermine the cabinet, but even intrigued with the Tories, and made overtures to Bishop Atterbury, to be his minister and adherent. He proposed to the king, it seems, when the ferment of public indignation occasioned by the explosion of the South Sea scheme was at its height, to dissolve the parliament, with a view to bringing in a Tory majority, who under his conduct would pass his measures. The king however, in the subject: the project obtained his majesty's concurrence, but was defeated by the firmness and intrapetity of Walpole. 'The Pretender and the Jacobites certainly at this time,' said Coxe adds, 'entertained the most sanguine hopes. Sunderland became a great favourite with them and the Tories, his health was constantly drank by them, and they affected to be secure of attaining, by his means, the accomplishment of their wishes. There are some strong assertions by Pope to this effect. To Bishop Atterbury, he said, in the first instance of the 5th of March, 1719, the king had made a violent speech against the minister, and at an earlier period, in Spence's 'Anecdotes,' p. 313. It also appears that he had contrived a plot for the political anathema of Walpole by persuading the king to offer him the post of master-general for life, with the view that if Walpole accepted, he should retire, and if he rejected, the king would either strike him from the cabinet, or, if he refused that, he would give offence to his majesty. The king however, when he found that Walpole had never expressed any desire for the place, nor was even acquainted with Sunderland's proposal, refused to allow the offer to be made to him. Sunderland, nevertheless, by persevering, or shifting his mode of attack, might possibly have succeeded ere long in effecting the downfall of his rival; but in the midst of his intrigues he was suddenly arrested by death, on the 19th of April, 1722, being as yet only in the forty-seventh year of his age. He had been twice married: first, in 1685, to the Lady Arabella Cavendish, daughter of Henry, duke of Newcastle, by whom he had a daughter; secondly, in 1702, to the Lady Catharine, daughter of the Earl of Burlington, by whom he had three sons, and who died 15th April, 1716; thirdly, to Judith, daughter of Benjamin Tichborne, Esq. (a younger brother of Viscount Tichbourne, in Ireland), by whom, according to some of the paragogy, he had no issue, but to whom he is said to have borne him a son, who died three days after himself, a daughter who died in infancy, and a second son, which came into the world five months after his death, and died in his third year. He was succeeded, Robert, the eldest, succeeded to the earldom, and died unmarried, 27th November, 1729; Charles, the second, became earl of Sunderland on the death of his elder brother, and on the death of his son, in 1733, became duke of Marlborough.
S U P

brough; and John, the youngest, who then succeeded to the family estates, was the father of the first Earl Spencer.

Lord Sunderland, who associated much with the women of the gay and literary circle, was one of the members of the famous Kit-Kat Club, and was also one of the set of noblemen who, about the beginning of the last century, used to make a weekly perambulation among the old book-shops in the metropolis in search of rare printed books, scarce pamphlets, manuscripts, and other rarities and curiosities of literature. To this fashion of collecting early literature, which then prevailed, we are undoubtedly indebted for the preservation of many things of more or less interest or value, which would otherwise have perished, not Devonshire House, Blenheim, and the Harleian collection of manuscripts, probably acquired in this way many of what are now accounted their most precious articles.

SUNDGAU, a subdivision of the county ofAlsace[edit], on the right bank of the Rhine, was one of the chief towns of the southern part, and having Béfourt, Mulhausen or Mülhausen, Altkirch, Cernay, and Thann for its chief towns: it was a dependency of the bishopric of Basel, and was held by the archbishops of Augsburg. It was ceded to France by the treaty of Münster, A.D. 1648, and is now included in the department of Haut Rhin. [RHEIN, HAUT]

SUNDWALL. [ANGERMANLAND.]

SUNNAH. This is the name given by the Mohammedans to the纶 of the Prophet, which they considered as an inspired revelation, and like the Koran, committed to writing by Mohammed, but preserved from his lips by his immediate disciples, or founded on the authority of his actions. It holds in Mohammedan theology the same place as the Mishna in the Jewish dispensation, that is, a second revelation to the orthodox Mohammedans call themselves Sunnites, in distinction to the various sects which are comprehended under the name Shiites, whose distinguishing characteristic is that they recognise as lawful khilafah Ali and his descendants. The Turks, as a nation are Sunnites, and the Persians Shites. Shiah, from which this latter name is derived, signifies a party or troop.

SUPERFICIAL DEPOSITS. [SURFACE OF THE EARTH.]

SUPERFICIES, the Latin form of the word surface, used in the sense of surface, and sometimes of area. The quantity of an area is called its superficial content, as distinguished from linear content or length, and solid content or volume.

SUPERIOR LAKE. [CANADA; MISSISSIPPI, RIVER.] 

SUPERSEDEAS, in law, the name of a writ used for the purpose of superseding proceedings in an action (Tidd's Practice; Archbold's Practice); in bankruptcy it is the writ used for the purpose of superseding the process of application by petition to the court of bankruptcy, and is granted on the ground that the flat is invalid in point of law, has not been duly prosecuted, &c. [BANKRUPTCY.] [Deacon's Law of Bankruptcy; Eden's Bankruptcy Law.

SUPPLEMENT (Trigonometry). The defect of an angle from two right angles. Also chords or arcs of a circle or other curve which have a common extremity, and together subtend an angle of two right angles at the centre, are sometimes called supplemental chords or arcs.

SUPPLY. [PARLIAMENT, IMPERIAL, vol. xvii, p. 271.]

SUPPRESSION. [ABSURD; INFLAMMATION.]

SUPRANATIONAL. In Christian Church, the doctrine of predestination and election, which arose out of the teaching of the school of theologians at Geneva, two different forms came to be taken by the Calvinistic party. Some hold that all the occurrences which take place on the earth have their origin in the subject of a special decree of God: that God decreed to create man solely for his own glory, and to display his glory in the eternal happiness of some and the damnation of others; that this decree remains unchangeable till the end, but is not directly, by which that end was to be wrought out; and that sin, the fall of man, and the introduction of evil into the world, were decreed by God to happen as necessary means to the end proposed, and God therefore so constituted man, and placed him in such circumstances that he could not but fall. The person who held this view was called Supralapserians (supra lapsamus), because, according to their system, the decrees of God respecting the salvation of some men and the rejection of others were in no sense consequent or dependent upon the foreseen fall of man, which itself (on the contrary) took place in consequence of a divine decree.

The other party were called Infra lapserians. They considered the decrees of God for fixing the eternal state of man as equally eternal and unchangeable, but they maintained that the foreseen fall, but left him free to act for himself; and, though foreseeing that he would fall, did not interfere to prevent him, but decreed that the consequences of this foreseen fall should result in increased glory to himself, and the eternal happiness of the greater part of men.

Beza, Gomar, and Voetius were of the Supralapserian party.

The synod of Dort adopted the views of the Infra-lapserians, and forgo further that Infra-lapserianism, and often not so far.

(Mosheim's Eccles. Hist., cent. xvii, sec., pt. ii; cii. 10-12; and the principal works on systematic theology).

SUPREMACY is a term used to designate supreme ecclesiastical authority. The term is generally used of the authority of the head of the church. The term supremacy is the authority, legislative, judicial, and executive, exercised until nearly the middle of the sixteenth century by the pope over the churches of England, Scotland, and Ireland, as branches and integral parts of the great religious body under its supreme head, but was abolished c. 1547-51, and a system of Protestant Episcopal church is that country in which the power of the Church of Rome has been abolished by law. The extent of the legislative authority of the pope was never exactly defined. Whilst it was regarded as nearly absolute at Rome, at Milan, and at Venice, it was at Paris, sought to be reduced within very narrow limits.

The papal supremacy was abolished by the legislatures of the three kingdoms in the sixteenth century. In order to secure a thorough understanding of a theory in that of a branch of persons holding offices in England and Ireland, as has been required to be taken, which is generally called the oath of supremacy, a designation calculated to mislead. It being in fact an oath of non-supremacy rather than of supremacy, we must, though in many branches of the religious and civil state, reduce the supremacy of the pope, it is silent as to any supremacy in the king. This oath is therefore taken without scruple by persons who are not Roman Catholics, whether members of the Anglican church or not. The form of the oath, or the language used in taking it, is as follows:—1. A. B. do swear that I do from my heart abhor, detest, and abjure, as impious and heretical, that damnable doctrine and position, that princes excommunicated or deposed by the pope, or any authority of the like nature, do not proceed from any authority of heaven, but are of men and not of God, or any other whatsoever. And I do declare that no foreign prince, person, prelate, state, or potentate hath or ought to have any jurisdiction, power, superiority, pre-eminence, or authority, ecclesiastical or spiritual, within this realm. So help me God. Under this, and many former statutes, all subjects were bound to take the oath of supremacy when tendered; but by the 31 Geo. III., c. 32. s. 18. no person since the 24th June, 1791, is liable to be summoned to take the oath of supremacy, or to be prosecuted for not obeying such summons; and Roman Catholics, upon taking the oath introduced by that Act, s. 1, in which the civil and temporal authority of the pope are abjured, may hold office without taking the oath of supremacy, which, as it now no longer relates to any part of the Roman Church, is unnecessary, or any other whatsoever. And I do declare that no foreign prince, person, prelate, state, or potentate hath or ought to have any jurisdiction, power, superiority, pre-eminence, or authority, ecclesiastical or spiritual, within this realm.

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Regal supremacy is not legislative, but judicial and executive only. Henry VIII. was first acknowledged as supreme head of the church by the clergy in 1537. Thus the Roman Catholic church in England, from that time, and by the statute of 26 Hen. VIII. c. 1., it was enacted that the king our sovereign lord, his heirs and successors, kings of this realm, shall be taken, accepted, and reputed the only supreme head in earth of the church of England, and shall have and enjoy, annexed to the imperial crown of this realm, as well the style and title thereof, as all honours, dignities, pre-eminencies, jurisdictions, privileges, authorities, immi-
nities, profits, and commodities to the said dignity of supreme head of the same church belonging and appurtenant; and shall have power from time to time to visit, repress, redress, reform, order, correct, restrain, and amend all such errors, heresies, abuses, offences, contempa, and enormities, whatsoever they be hid by, or for, under pretense of authority or jurisdiction, may lawfully be reformed, repressed, ordered, redressed, corrected, restrained, or amended, most to the pleasure of Almighty God, the increase of virtue in Christ's religion, and for the conservation of the peace, unity, and ecclesiastical polity of the same church, and for the securing of the public and ecclesiastical laws, foreign laws, foreign authority, prescription, or any other thing to the contrary notwithstanding.'

Dr. Burne observes, 'that after the abolition of the papal power and the population of the city by the princes of this realm, for above a century after the Reforma-
tion, were more delighted than that of being the supreme head of the church, imagining (as it seemed) that all that power which the pope claimed and exercised (so far as he was able) was by the statutes abrogating the papal authority annexed to the imperial crown of this realm, not attending to the necessary distinction that it was not that exorbitant lawless power which the pope usurped that was thereby be-

come vested in them, but only that the ancient legal autho-

rity and public law of the greater part of the dominions of the ecle-
siastical, which the pope had endeavoured to wrest out of their hands, was re-asserted and vindicated. The pope arrogated to himself a jurisdiction superior not only to his own canon law, but to the papal laws of kingdoms. And this arrogation of this realm above mentioned seem to have considered themselves plainly as popes in their own do-
mions. Hence one reason why a reformation of the ecle-
siastical laws was never effected seemeth to have been be-

cause, by the loss of that supremacy, they were unable to retain the church in an unsettled state, and consequently more dependent on the sovereign will of the princes.'

Burn's Ecclesiastical Law, tit. 'Supremacy.'

Regal supremacy over the church is not recognised by the Cabinet, nor in the Church of England, which boasts that it has no head upon earth. Notwithstanding this bold assertion, the king possesses a controlling power over the acts of the General Assembly of the Church of Scotland even in spiritualibus, though since the accession of the crown it has been seldom if ever exercised.

SUR, or SOUR. [Tyrk.]

SURAT or, as the natives pronounce it, Surous or 'beauty,' a large city on the western coast of Hindustan, in the pre-

sidecy of Bombay and province of Gujarath, stands on the

side of the Tank or Taptee in 21° 15' N. lat. and 72° 50' E. lon., the river falls into the Gulf of Cambay about 15 miles west from the city. Surat is about 120 miles north from Bombay, direct distance: it is situated in a fertile country, distant from the sea about 6 miles, in the midst of dense jungle, and is a favourite hunting district, wild hogs and other game being abundant. There are numerous villages and farms in the neighbourhood.

The city of Surat is in the form of a semicircle; the Tapi is the chord, near the centre of which is a citadel or small fortified castle. The city is surrounded by a wall about six miles in circuit, in good repair, with semicircular bastions, and with battlements. Milburn (Oriental Commerce) and others speak of two walls, one round the city and another round the suburbs, the outer wall being twelve miles in cir-
cuit, and a mile distant from the inner wall; but as bishop Heber, who was there in 1825, and Mrs. Postans, who visited it in 1838, only mention one wall, it is to be presumed the wall round the suburbs has been removed. The citadel is garnished by a few sepoys and European artillerymen.

Surat, though a large city, is by no means a handsome one. The streets are narrow, winding, unpaved, in the wet season they are the abode of vermin and disease. The houses are generally high, and are mostly constructed of a frame-

work of timber (often bamboo) filled up with bricks or sun-
dried mud; most of the upper stories project over the lower ones. The houses however of some of the principal mer-

chants are of stone, and are large and well-built, but there are no public buildings worthy of notice as speci-

fication of architecture, and indeed the only structure which has much of interest attached to it is the hospital for aged and diseased animals: it occupies a large piece of ground, surrounded by high walls, and is divided into compartments or wards, with every arrangement requisite for the comfort of the different classes of animals, as horses, oxen, sheep, goats, &c. It has been said that offensive and noxious vermin were kept, but Mrs. Postans denies that this was the case in 1838. It is an establishment founded by the Jains, and is richly en-

countered. The residence of the head is modern, but is not at all striking. There is a neat English church, which was consecrated by bishop Heper in 1823. A large and picturesque burying-ground, outside the city, contains numerous tombs of former servants of the East India Com-

pany. The style of architecture, some of them being 150 or 200 years old; that of Sir George Oxenden, for size and solidity, is worthy of one of the founders of the English empire in India. The prosperity of the town was estimated in 1829 at 800,000, which was probably too much, but it was perhaps not less than 600,000. It is now very much reduced, the greatest part of its commerce having been transferred to Bombay. The inhabitants at present probably do not exceed 150,000, perhaps not 100,000. They consist of Hindoos, who are mostly Jains, of Moham-

medans, many of whom are Bora, of Parsies, and of Ar-

menians, Jews, and various other races, besides Europeans.

The Parsies and the Boras are the most flourishing part of the trade; and the Jains are engaged in the carriages to the temples, and occasional trade as banians and money-lenders. There are also great numbers of religious mendicants in this city and its neigh-

bourhood, Fakters, Togies, and Gossans, who enforce their alms from the superstition both of Hindoos and Moham-

medans.

Surat is the station of a British military force: it is also the seat of the supreme court of justice for the whole presi-
dency of Bombay, of a circuit court, and of a board of customs and revenue. The English society is numerous, and of the best kind.

The Taptee or Surat is a wide river: but the navigation is dangerous, from shifting sand-banks, even to boats; and large vessels are prevented from entering it by a bar, and therefore anchor in the Surat Roads, or Swally Roads, as they are commonly called, from the small sea-port of Swally, at the mouth of the river, where the ships discharge and take in their cargoes. The boats which navigate the river are generally of 30 and 40 tons, half-decked, with two masts and two large lateen-sails. The river opposite the city is brackish: water for domestic purposes is raised by oxen from wells, and there are also large tanks to collect the rain.

The imports to Surat are chiefly from Arabia, Bombay, and Brazil, and consist chiefly of rice, sugar, pepper, drabs, piece-goods, raw materials to be worked up into manufac-
tures, and bullion. The exports are mostly manufactures of Surat and the neighbouring districts, raw cotton, and a few other articles of native produce. The vessels are chiefly English, Arabian, and Portuguese.

The history of Surat is eventful and interesting. It is a place of such antiquity as to be mentioned in the ancient Sanscrit poem 'The Râmdâkyana.' After the conquest of Hindustan by the Mohammedans, it was the chief port at which they embarked on the pilgrimage to Mecca; and when the Europeans first discovered the passage by the Cape of Good Hope, was the greatest place of maritime commerce on the continent of India, being in immediate communica-

tions with the African coast, and was the most safe and conveniently situated for trading not only with the western coast of that continent, but with the gulf of Persia and Arabia. The Portuguese were the first Europeans that reached the western coast of India by sea: after establishing themselves at Goa, they opened a trade with Surat about 1561. In 1603 Mr. Middenhall, a London merchant, reached Agra, and in 1606 obtained an amply grant of commercial privileges by a firman from the emperor of Shah-Jehan. In 1610, proceeding to Surat, found some Portuguese ships ready to oppose him, and was therefore obliged to fight for our first trading trip with the inhabitants of Hindostan; and this was the commencement of a series of actions fought with the Portuguese by the Captain of Basset in 1612 and 1614, and Captain Downton in 1614, in all of which the English were
SURTIES. [DRAPEESS]
SUREIGN. [CRAUSEE]
SUTURE. A surety is one who undertakes to be answerable for the acts or non-acts of another, who is called his principal. Such undertaking is often made in writing, and it is then binding in law, unless made upon some sufficient consideration; but in the case of a bond this consideration is inferred from the circumstances of the obligation incident to its execution as a guarantee. In the latter undertaking it is not by bounty or reference to each other that they can be considered as incorporated. The instrument by which the surety becomes bound, when it has reference to civil matters, is generally called a guarantee, and ordinarily consists of an undertaking to the principal, for the integrity, skill, attention, and other like matters. In such cases the guarantee expressed would probably be the furnishing of the goods to the principal, or his employment by the party guaranteed, if the guarantee referred to any other matters than such, and he was bound by law to perform the same as the surety. The law prescribes the same rule of law prevalent in the case of all written instruments,—that they shall be understood in the sense most unfavourable to the party making them which the words will reasonably bear. The application of the rule, when the parties are not understood to put any particular construction on the guarantee, is to be decided by the court, and whether the parties or the instrument is that which was a subsisting guarantee. Thus, where the surety undertakes to be answerable to the amount of 1000l. for goods supplied to his principal, this may mean that he will be answerable in 1000l. as a surety for such goods supplied at any time, or for any goods supplied afterwards; or, that he will continue to be answerable to the amount of 1000l. for any indefinite period during which goods may be supplied, although the principal has paid for the first 1000l. worth. The latter kind is called a continuating guarantee. If a party, as Lord Ellenborough says, in deciding upon a case of this kind, 'means to be surety only for a single dealing, he should take care to say so.' Observations of a similar character may be made as to the application of payments by the principal, for goods, to the principal, if the payment of a particular debt means to insist upon the application of the first money afterwards paid by his principal to discharge that debt, he should take care that such intention is fairly apparent upon his part, and if the guarantee is that which was a subsisting guarantee, as that whereby the Mogul ensign still waves on the walls of the castle of Surat, in company with the English jack. By the treaty of 1836 the Marathas were compelled to relinquish all their claims on Surat. Surat has suffered severely by fires; a large part of the city was destroyed by one in 1836; but the houses had been, to a considerable extent, rebuilt when Mrs. Postans was there in 1838.

SURL. [TAXATION]
SURD. This word has been used to signify an irrational arithmetical or algebraical quantity since the time of the introduction of algebra into Europe; though why any term formed from surds was used in such a sense is not known; perhaps it was the supposed translation of an Arabic term. In the article just cited we have said as much as is necessary on the subject. We will only add that the second volume of Cossal's History of Algebra contains an account of the tenth book of Bucidi, with reference to the use made of it by the earlier algebraists.

SURT. [TAXATION]
to employ a reasonable degree of prudence and attention in
inventing his goods, or inspecting and checking the se-
coupons in advance, and where he has been guilty of gross negligence in abiding from
It is a general rule that the surety is entitled to the
the right of all the securities which the guaranteed has
against the principal.
If the surety is entitled to the
if between the two equations exist, \( \phi(x, y, z) = 0 \), any point may be
chosen in the plane of \( x \) and \( y \), by means of given values
of \( x \) and \( y \), and the corresponding value or values of \( z \) may be
be obtained. In some cases the law of

Surety, straight...the
If...given...principal.
But...Surfaces...For
= counts
thereby
component...principal,
repay...case...amount
he...court...
tribute...merely
thinks...do
Future of
(cipal,...principal.
relinquishes...a...pay...
SURFACE.
relinquishes...

The...right...or
debt...
right...
raise...
defaulters
were
liable.
The law is the same as to co-sureties, whether all have been created by the same instrument in writing,
or each one by a distinct instrument.
(Fell, On Guaranties...2

SURETY OF THE PEACE' is the acknowledging of
a recognizance or bond to the king, taken by a competent
judge of record for keeping the peace. Magistrates have
the power to take such recognizances, which are generally done
by the party acknowledging (recognizing, and hence the term
recognizance) and that he is in action upon the
king to a certain amount, the condition of which bond is,
that he or the party for whom he becomes bound shall keep
the peace during a term named in the condition. Such
recognizance may be obtained by any party from another
on application to a magistrate, and stating on oath that he has
just cause to fear that such other...will burn his house,
or do him a corporal hurt, as by killing or beating him, or that
he will procure others to do him such mischief. Upon
such application being made to the magistrate, it is his duty
to investigate the point and to binder a recognizance either
alone or with others, into such recognizances as he
thinks the case demands. The fear must be of a present
or future danger: no recognizances are demandable on the
ground of a past dispute. Upon the neglect or refusal of the
party bound to enter into the recognizances demanded, he
may be committed to prison by the magistrate for a
specified period, unless he sooner complies. If the recognizance
is forfeited by a breach of the condition, it may be
removed into one of the superior courts and there proceeded
upon.
Sureties also may be similarly required for the good
behaviour of parties who have been guilty of conducting
themselves with a breach of the peace, abusing those in the administration
of justice for.

(Burn's Justice, tit. 'Surety of the Peace."

SURF. [S.] 593
SURFACE, SURFACES, THEORY OF. For the
more definition of surface, see SOLID, &c. We are here to

speak of that branch of algebraic geometry which consists
in the generation and properties of curve surfaces following an
amended law.
If three planes, each at right angles to the other two, be
taken as the planes of CO-ORDINATES, the position of any
point is determined as soon as its co-ordinates, or distances
from the three planes, giving the point. If the co-ordinates of a point
are \( x, y, z \), and if between these two equations exist, \( \phi(x, y, z) = 0 \), any point may be
chosen in the plane of \( x \) and \( y \), by means of given values
of \( x \) and \( y \), and the corresponding value or values of \( z \) may be
be obtained. In some cases the law of

Some surfaces are distinguished advantageously by nature
and order of their equations. Thus we have surfaces of
the first order, in which the equation is that of the first degree (this
case contains the plane only); surfaces of the second order,
which will be either curves or surfaces.

Surfaces are also distinguished by the mode of genera-
tion, and some of the principal cases are as follows:—

1. **Cylindrical surfaces** are generated by a straight line
indefinitely produced in both directions, which moves so as
always to be coplanar with a given line, and to have one of its
points on a given curve.

2. **Conical surfaces** are generated by a straight line
indefinitely produced in both directions, which always
passes through a given point or vertex, and has one point in a
given curve.

3. **Surfaces of revolution** are generated by the rotation
of a curve about an axis, relatively to which it always
retains one position. The common cone and cylinder, the
sphere, and others of the greatest practical use, are con-
tained in this class.

4. **Tubular surfaces** are generated by a circle of given
radius, which moves with its centre on a given curve, and
its plane at right angles to the tangent of that curve. When
the given curve is a circle, the tubular surface is a common
ring.

5. **Ruled surfaces** (the surfaces régies of the French
writers) are those which are described by the motion of a
straight line, which neither remains parallel to a given line
through any point, if it is given, but passes through a point.
Among many others, the whole class of conoidal surfaces,
made by a straight line which moves parallel to a given
plane, and always passes through a straight line perpendicular
to that plane and a given curve. The surface of a
spiral staircase, as it would be, if there were no steps but only a gradual ascent, is an instance.

6. **Developable surfaces** are those which can be
unwrapped on a plane without any doubling of parts over
one another, or separation; that is, without being rumpled or
folded. The only familiar instances are the cylinder and
cone.

**SURFACES OF THE SECOND DEGREE.** This
name is given to all those surfaces of which the equation
is of the second degree, and in the form of

\[ ax^2 + by^2 + cz^2 + 2fyz + 2gxz + 2hxy = 0, \]

to which form any equation of the second degree between
two variables may be reduced. These surfaces hold the
same place as the plane has in the first degree, and in the
second degree, are solos sections, among curves; and every
section made by a plane with any surface of the second
degree must be a curve of the second degree. The following
article is intended entirely for reference, as the books
which treat on the subject hardly ever give the complete
tests for the separation of the different cases from each other.

1. The preceding equation may be wholly impossible, or
in capable of being satisfied by any values of \( x, y, \) and \( z. \)
This happens when the left-hand side can be resolved into

(1)
the sum of any number of squares which cannot vanish simultaneously.

2. It may represent only one single point. In this case the left-hand side can be resolved into the sum of three squares, which vanish simultaneously for one set of values of x, y, and z.

3. The equation may belong to a single straight line. In this case the left-hand side can be resolved into the sum of two squares.

4. The two last cases have a particular case which is algebraically very distinguishable from the rest, though it can only be geometrically represented, by saying that the point or line is at an infinite distance from the origin.

A. The equation may belong to a single plane. In this case the left-hand side is a perfect square.

6. Or to a pair of planes, either parallel or intersecting. The left-hand side can then be resolved into two different factors of the first degree.

In the preceding cases there is no other surface than that can be represented by one or several equations of the first degree. We now come to the cases in which new surfaces, not plane, are generated. But we may first observe that the left-hand side of the equation has a property much resembling + a celebrated one of integer numbers. If it be the sum of any number of squares exceeding four, it may be reduced to the sum of four squares at most.

7. The equation may belong to a cone, having for its base any one of the conic sections. But in every case the same cone may be described by a circle only: that is, every cone of the second order is a circular cone, right or oblique. In this case the first side of the equation takes the form $P^2+Q^2+R^2$, or $P^2-Q^2=R^2$, P, Q, and R being expressions of the first degree in the form $Ax+By+Cz=E$.

8. The equation may belong to a cylinder having for its base any conic section. But the ellipsoidal, paraboloid, and hyperbolic cylinders are perfectly distinct. In this case the first side of the equation can be reduced to the form $P^2+Q^2+R^2=0$, $P^2+Q^2=mR$, and $P^2+Q^2=mR$. The conditions under which the several cases are produced are exhibited in the following table. Let

<table>
<thead>
<tr>
<th>$V_x$</th>
<th>$V_y$</th>
<th>$V_z$</th>
<th>$W$</th>
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<tbody>
<tr>
<td>$V_x=bc+ca-ab-a^2-b^2-c^2$</td>
<td>$V_y=ac+ba-bc-a^2-c^2+b^2$</td>
<td>$V_z=(bc-ca) a^2+(ca-bc) b^2+(ab-cb) c^2$</td>
<td>$W=V_x+V_y+V_z$</td>
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When $V_x=0$, $V_y$ is a perfect square: if $V_x$ also $=0$, the three expressions

$$\begin{align*}
-V_x &= 2a^2b^2c^2+4ab^2c^2-2bc^2a^2+ca^2b^2-c^2a^2-b^2a^2-c^2b^2+2bc^2a^2+c^2b^2+a^2bc+2bc^2a^2
\end{align*}$$

are all equal. Let either of them, with its sign changed, and increased by $\frac{1}{2}$, be called $W$. Again, when any three of the six quantities,

$$\begin{align*}
bc & \quad ca & \quad ab & \quad c & \quad b & \quad a
\end{align*}$$

vanish, the others also vanish. Let those vanish, and also let $a^2, b', c$' be in the proportion of $a, c, b'$, or of $b', c, a$. When this happens, the three following:

$$\begin{align*}
d' & = b' c & d' & = c' a & e' & = a' b
\end{align*}$$

are equal: let, either, with its sign changed, and increased by $\frac{1}{2}$, be called $W'$.

The table is then as follows, in which $p$ means either of the signs $+$ or $-$, and $n$ means the other; and a supposition put in parentheses means that it is a necessary consequence of what precedes, or is not independent.

$$| W | V_x | W' | V_y | V_z | W'' | V_{1} | V_{2} | V_{3} | V_{4} | V_{5} | W_3' | W_4' | W_5' | W_6' |
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For example, it is the condition of an ellipsoid that $W$ and $V_y$ should be finite with different signs, that $V_x$ should be positive, and $V_z$ of the same sign as $V_{1}$: it is the condition of intersecting planes that $W$ should have the form $0, 0, 0$, or that $V_y$ and $V_z$ should both vanish; that $W$ should be $\infty$; and that $V_z$ should be negative. It is the condition of a single hyperboloid, if $V_z$ be positive, that $W$ and $V_y$ should both differ in sign from $V_{1}$: but if $V_z$ be negative, it is enough that $W$ and $V_y$ should have the same sign. All that precedes is equally true, whether the co-ordinates be oblique or rectangular; but the following is only true for rectangular co-ordinates: if the surface be a surface of revolution, it is necessary that

$$\frac{V_x}{a^2} = \frac{V_y}{b^2} = \frac{V_z}{c^2}.$$

The forms of the ellipsoid and the two hyperboloids may be best conceived by means of the particular cases in which they are surfaces of revolution. Let an ellipse revolve about one of its axes, and let all the circular sections be flattened into ellipses: the result will be an ellipsoid, derived from its particular case, the spheroid. Let an hyperbola revolve about its minor axis: the two branches will generate only one branch of a surface: let the circular sections be flattened into ellipses, and the result is the single hyperboloid. Let the hyperbola revolve about its major axis: the two branches will generate two branches of a surface; and if the circular sections be flattened into ellipses, the result is the double hyperboloid. For the elliptical paraboloid, let a parabola revolve about its principal axis, and let the circular sections become ellipses. The hyperbolic paraboloid has no surface of revolution among its cases, but its form may be conceived as follows:---Let two parabolas have a common vertex, and let their planes be at right angles to one another, being turned contrary ways. Let one parabola then move over the other, always continuing parallel to its first position, and having its vertex constantly on the other: its arc will then trace out an hyperbolic paraboloid.

The ellipsoid and the two hyperboloids have centres, but neither of the paraboloids has one. The surfaces which have centres possess an infinite number of triple systems of diameters having properties corresponding to those of the conjugate diameters of an ellipse and hyperbolas. These we shall not enter further into, but shall proceed to point out how to determine the position of the centres and principal diameters or axes (that is, the system of conjugate diameters).
and, each of which is at right angles to the other (two) in either of the surfaces having a centre. Resuming the original equation, and the co-ordinates being supposed rectangular to the coordinates of the centre, X, Y, Z, are thus determined. They are fractions whose denominator is \( -V_n \), and whose numerators are

\[
(bc-a^2)z^2 + (ab-c^2)z + (ad-b^2)y + (cd-a^2)x
\]

and if the origin be removed to the centre, the axes retaining their original directions, the equation of the surface becomes

\[
V^2 + q^2 - 2ax - 2by + 2cz + 2e + f = 0,
\]

where \( W \) is the expressions derived by that letter, and will be found to be also \( X^2 + Y^2 + Z^2 + e = f \).

Let the three principal axes now make angles with the axes of \( x, y, z \), as follows:—the first, angles whose cosines are \( a, b, \gamma \); the second, angles whose cosines are \( a', b', \gamma' \); the third, angles whose cosines are \( a'', b'', \gamma'' \). The equation

\[
v^2 - V_n^2 + V_n^2 = 0
\]

has always three real roots; let them be \( A, A', A'' \). Then the directions of the principal axes are to be determined from

\[
x = -bc - a^2 + (A - A') + A^2,
\]

\[
y = -cb - a^2 + (A - A') + A^2,
\]

\[
z = -ab - a^2 + (A - A') + A^2.
\]

To find \( a', b', \gamma' \), interchange \( A \) and \( A' \) in the above; and to find \( a'', b'', \gamma'' \), interchange \( A \) and \( A' \) and \( A'' \). The principal axes being thus determined, the equation to the surface, referred to the principal axes, is

\[
A^2 X^2 + A'^2 Y^2 + A''^2 Z^2 = 0,
\]

a form which is fully considered in all elementary works on the subject, and from which the principal properties are derived. (Algebraic Geometry, in the ‘Library of Useful Knowledge’.)

The above proofs of the preceding assertions, and their extension to oblique co-ordinates, see a paper 'On the General Equation of Surfaces of the Second Degree,’ in the Cambridge Philosophical Transactions, vol. v., part 1. Under the form of considering the surface of the second degree, we have in fact been treating the general properties of the equation of the second degree, with three variables, and have solved various other problems of geometry and mechanics. The principles applied in this solution have been generalized in a paper on ‘Linear Transformations,’ by Mr. Boole. (Cambr. Misc. Journ., 1858.)

SURFACE OF THE EARTH. Geology, by teaching us to look upon the form and distribution of land and sea, the features of hills and valleys, and the various deposits of pebbles, sand, gravel, etc., of the surface of physical earth which have no longer in operation upon those areas where once they predominated, confers upon the surface of the earth an interest much greater than that which belongs to pictorial combinations, or even to agricultural utility and commercial adaptation. Uniformity, inequality, height, depth, and area, every least peculiarity of form, whatever is remarkable in any part of the surface of the land or bed of the sea—these are effects of causes which require to be traced out before the problem of the physical history of the globe can be correctly and satisfactorily solved.

Superficial Deposits.—If the stratified and unstratified rocks which compose the skeleton of the earth were laid bare to our view, the aspect of the globe would be far more rugged than it is now. The valleys would in many cases lose their present appearance, and become mere ravines, some of which are no longer in operation upon those areas where once they predominated, confers upon the surface of the earth an interest much greater than that which belongs to pictorial combinations, or even to agricultural utility and commercial adaptation. Uniformity, inequality, height, depth, and area, every least peculiarity of form, whatever is remarkable in any part of the surface of the land or bed of the sea—these are effects of causes which require to be traced out before the problem of the physical history of the globe can be correctly and satisfactorily solved.

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The soil, gravel, clay, peat, and other substances, which by their accumulation mask the features of the interior rocks, constitute a peculiar set of superficial phenomena which have been used, and yet not sufficiently, studied by geologists. It is certain that without much more exact appreciation of the causes which have permitted the aggregation of the 'superficial deposits’ already named, our analysis of the processes whereby the earth has been made fit for the residence of man, and adapted to its present uses, must be very imperfect.

Soil is often supposed to be merely the disintegrated parts of the subjacent rocks, and this is sometimes really the case; trap rocks, for example, of which the felspar and the hornblende become decomposed by the atmosphere, yield a soil composed of particles of the same kind. Sometimes the process is greatly accelerated by the action of foreign ingredients. But the soils which cover clays and limestones and sandstones are seldom of this simple origin. The basis of these soils may be generally derived from the subjacent strata, but they usually contain foreign ingredients. Thus the soil on the chalk and limestone hills of England is often sandy, sandstones are covered by loam, and clays overspread with pebbles. The effect of this admixture of foreign substances with the disintegrated parts of the native rock is useful for fertility.

We may often understand the cause of these admixtures by considering the effect of rains and currents of water on the sloping surface of the earth. These effects arrive at a maximum in particular vales and plains, into which many rivers and streams flow. In such vales the soil is in fact a mixture of calcareous , argilaceous, and arenaceous parts, and its indigenous plants are correspondingly varied, and include many which are not found growing together on any one of the soils which are here mixed.

To watery agency, acting under the actual circumstances of physical geography, we may also ascribe many even extensive accumulations of gravel and sand which lie along the sides of valleys and in hollows of hills, or on the slopes of mountains. It requires something like the same calculations to determine, that in particular valleys inundations have formerly reached higher levels than at present, to apply the same explanation to terraces of gravel and sand now considerably above the actual flood-mark, but sloping parallel to the general inclination of the valley.

The beds of old lakes, often consisting of layers of shelly marl, with bones of existing or extinct quadrupeds, the surfaces of silt which lie along the actual and antient shores of rivers, and often containing ancient subjacent peat, present no difficulty as to their origin. For the processes by which peat grows and trees are buried, and marshy land is saved from the sea, and lakes are filled up, are at this day in action. To all such peat or turf moors, subterranean forests, marshes of many kinds of lake-beds, and sand and gravel, the title of alluvial deposits is very commonly given. Generally, they require no supposition of extensive changes of physical geography produced by violent disturbances of nature, but seem to be merely the result of the actions of the most common processes of diluvial action, though perhaps not in the same situations on the earth's surface. But there are other gravels, sands, and clays, to which this explanation cannot be applied without calling into question the whole great system of physical geography, or physical processes not seen by daily operation such as extensive displacement and change of level of land and sea; unexampled floods of water; surprising alterations of climate, or movement of glaciers in situations where now the snow and ice of the coldest winter melt with the first breath of spring. These phenomena were classed under the title of diluvial deposits, at a time when their origin was very generally ascribed to violent floods of water, and the title is still retained even by geologists who do not admit this hypothesis.

These diluvial deposits are commonly admitted or assumed to be of older date than those called alluvial, and, taken in a collective sense, they are so, but this is the least important circumstance characteristic of their history. The conditions of their formation, and their geographical results, are new subjects for investigation.

1. It is often seen that thick deposits of clay, sand, and pebbles, or large fragments of rock, lie on the very summits of hills (as abundantly on the hills which adjoin the way of the Tiber in Lazio) near the Tyrrhenian sea.

2. Fragments of rocks quite unlike those of the vicinity lie in valleys, on hills, (as on the Salève near Geneva), and even on islands (as on Staffa).

3. These fragments are found solitary, or buried in clay, sand, or gravel, and are in part, as those in the Hardwood in Huntingdonshire, near Birmingham, in Holderness, and other parts; and they are such that no stones of like nature occur anywhere in the natural drainage of the country.
where the gravel is accumulated, nor within 20, 30, or even 100 miles of the spot.

4. The fragments (often called boulders) appear thus in several cases to have been transported from particular parts of the country, over elevated ground, across the natural valleys and ranges of hills, but yet are, in some cases, distributed in a country which seems a decided departure on some of the greater features of physical geography. Thus the abundantly spread detritus from the Cumberland mountains crosses the island to Tynemouth, and reaches the coast of Yorkshire, but does not cross the Pennine chain of mountains from the Alps (Staunmoor), through the high plains along the western side of it as far south as Manches-
ter and the plains of Cheshire and Staffordshire. In like manner the detritus from the Western Alps has been carried of the Cumbrian chain, in a series of small lakes formed on the level of parts of the Lake of Geneva, and on the insalved Salève Mountains; yet it has been observed that the lines followed by the boulders are those of the great valleys, so that each great valley has been the direction in which were carried the blocks from the head of that valley.

5. It is observed that often the largest blocks contained in a mass of diluvial detritus lie at the top, resting on the smaller gravel and sand; and that below the whole mass the hard rocks are scratched by parallel distinct small grooves, which are proofs of the dragging movement to which the stones were subject in their passage.

6. Though in some cases successive deposition can be traced in the parts of a diluvial mass, it is very often seen that the materials are entirely unarranged, mere heaps of stones, and even indifferently stuck in clay, large and small, heavy and light, absolu-
tely without any stratification, such as long suspension in water must certainly have produced.

7. Finally, amidst such confused masses, bones of land quadrupeds, mostly or entirely of extinct species, and even of extinct genera, occur, and locally even in abundance. These are however more common in laminated lacustrine deposits resting upon the diluvial masses, or perhaps covered by them.

It has been thought possible to explain these charac-
teristic phenomena by many local inundations, or one general and overwhelming flood, capable of overcoming many of the lesser inequalities of surface-level, but modified in its course by the larger ranges of mountains and valleys. And as in the northern zones of the world (which have been much investigated in this respect) there is a very fre-
quently observed direction of the boulders to the south or south-east, it has been proposed for consideration whether such a change of level and sea in the polar regions might account for what seems a general fact. But further, as the most abundant deposits of this nature have been drifted from particular chains of moun-
tains, the most remarkable of which are the present mountains of Norway, the Alps, &c., all which districts have undergone elevation at some time, it has been thought that their upward movement may have been the cause of the displacement and transport of the blocks. (Buckland, Reliquiae Diluvianae; Elle de Beaumont, Sur les Révolu-
tions du Globe.)

It has however been proposed to account for the distribution of the boulders by a more gradual action of the waters of the sea. If the region of Cumbrian rocks, for example, and a very large portion of the north of England, were sup-
poused to be raised from the sea, by a continual or intermit-
ting movement, so as to bring successively under the action of the breakers the whole country to the east and south-east of the area now occupied by the Cumberland mountains, it would be conceivable that the drifting of the boulders to the east and south, by the continual tendency of the tides and currents of the sea. (Phillips, in Treatise on Geology, &c.; Whewell, in Murchison's Siluru-
ian System, &c.) has been represented as adequate to carry off from the shore one or more formations of mud and fragments of rocks, and, by melting or turning over, to spread them on the bed of the sea. This sea-bed raised would show the accumulations from such icebergs, often in narrow bands or isolated patches, such as really occur, and have been long celebrated, among the heaps of Norwe-
gian detritus which lie on the sandy plains of North Ger-
many. (Lyll, Principles of Geology; Murchison, Silu-
rian System.)

Finally, ice in another form has been appealed to for the explanation of diluvial phenomena. The formation of glaciers in mountain valleys is such as to permit their forward movement down a slope, and their carrying with them in their progress fragments of rocks and heaps of gravel and mud which by any cause fall upon their surface. These heaps of moraines accumulate along the sides and at the lower termination of them, and the surrounding, or rather confused aggregation, of the materials in them re-
sembles very much the diluvial masses. The surface of the rocks below a glacier is scratched, as we have before stated to happen in places where boulders are noticed; and as in the formation of moraines, the moraines in the Jura and the Alps, &c., are also tended much farther from the mountain-summits than now they are, it has been conjectured that antiently, in the times coincident with or preceding the diluvial period, they were subjected to a movement similar to that of the Alps to the Jura, from the mountains of Norway to those of Bohemia, and from Shap Fells in Westmoreland to the mouth of the Humber. Upon the subsequent contrac-
tion of these glaciers, the moraines they had left would ex-
perience some changes by the action of water (melted ice), which might then run in lines impossible for watery currents after the ice was fully removed. (Agassiz, Études sur les Glaciers.)

We do not propose to investigate any of these hypotheses. Geologists have been remarkable for sagacity adopting and as easily abandoning most of them; and others might have been added merely as examples to be avoided. It may be proper however to point out three things which may be useful to remember in further prosecuting this subject.

1. It is extremely improbable that we can determine whether the accumu-
lation to be explained happened on the land at its present level, or on the bed of the sea.

2. It must be determined by evidence what was the prob-
able character and elevation of the countries where dilu-
val accumulations excite attention.

3. In proposing a general cause, such for example as the movement of glaciers, it must be shown to be adequate to satis-
ify all the minuter details of the phenomena, and set forth distinctions and general limits characterized by extensive induction from facts observed in the earth itself, or admitted as parts of general cosmical theory. [Geology; Re-
frigération; Submarine Forests.]

The determination of the cause of the diluvial accu-
mulations is of the highest importance to geological theory. It is impossible to doubt that to the same cause must be ascribed many considerable modifications of the pre-
existent surface of the land. If, abstracting our attention from the accumulated deposits which conceal the striated and other rocks, and from the phenomena of the interior, we look at the actual form of its surface, there appears little that is easier of explanation by the application of known and real causes. The relative areas of sea and land, of the peculiar distribution of the present glaciers, the directions of mountain-ranges, and remarkable vales and prmts; the individual features of hills and valleys; the degree in which the land is wasted in some quarters and augmented in others; and the rate of change which may take place in these respects—all this may be satisfactorily re-
ferred to submarine and subaquatic disturbances of different periods, to the effects of the sea upon the land when the land was not at its present level above the water, and to the operation of the atmosphere, rains, rivers, and winds.

From this large field of research we shall select for brief illustration the outlines of land and sea, the directions of high and low ground, and the individual features of hills and valleys; the few examples needed will be drawn from the

Much of the irregularity of outline, on a large scale, of the British Islands depends on the form in which the ancient inundation with general limiting conditions was. This is as follows:

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and west ridges and hollows of the strata which reach the sea in South Wales and North Devon, give to Pembroke-
shire, Glamorganshire, and North Devon remarkable and
detailed alternations of promontory and bay. The Isle of
Wight is formed on an axis of elevation from the Needles
to Culver Cliff; while north of it are the axis of depression of
the Solent, the axis of elevation of the wealds of Sussex,
and the axis of depression of the estuary of the Thames.

The same ridges and hollows, and others of a great
importance, produce continuous chains of hills—the North-
western Highlands, the Grampians, the Lammermurr range
of hills, the Wicklow mountains, the Snowdon, the Ber-
wyn, and Malvern hills, and multitudes of other narrow
tracts of elevation. But the effect of sea wastes the
waters, emptying one portion of a natural district, leave marks of inequa-

lity on the surface. Thus the great Pennine faults, ranging from
Newcastle to Brompton, and thence to Kirby Lonsdale and
Shotts, occasion different of level in the ground of
1000 and 2000 feet for a length of 100 miles.

In all cases, and in every country, it appears that, with-
standing the operation of later agencies, the main features of
the surface of the land are due to the positions in which
subterranean movements left the displaced masses of rocks.

But the operation of subsequent agencies is distinctly trace-
able in modifications of these features on the sea-coast, and
in the interior of every country.

The surface of the land has been coasted, and as the va-
ried strata and masses which come to the surface have unequal compactness, and are unevenly capable of
resisting the chemical and mechanical agencies which origi-
nate in the varying heat and moisture of the atmosphere,
we find in consequence a multitude of irregularities, both on
the sea-coast and in the interior. The direct relation to the
properties of the rocks. On the sea-coast some parts are known to be
wasted (as the coasts of Sheppey, Dunwich, and Bridding-
ton) even rapidly, one or several yards annually on the aver-
age, others seem almost unchanged by a thousand
years of storm and tempest, as the ‘Worm’s Head,’ and some
considerable tracts of new land have been added to the
shores of Lincolnshire, along the banks of the Thames,
and by the side of the Severn.

The line of coastal rocks from the Tyne to the Humber is in-
structive in this respect. The prominences on the
Durham coast, ending with Hartlepool, are guarded by magnesian limestone, and the estuary of the Tees is excavated in red
mari and lias clays. The peak near Robin Hood’s Bay,
Scarborough Castle, Fife Bay, and Flamborough Head
are all promontories of hard rocks; but Robin Hood’s Bay,
Scarborough Bay, Filey Bay, and Bridlington Bay are all
elevated, and wasted, and in clay of the liassic, oolitic, and
diluvial periods, from the earth’s crust, on a larger ground, to
which divide these vales are ranges of harder rocks. A transverse section of
the English strata shows always, both on a large and small
scale, this important fact (see Fig. 1), and every well-

shaded topographical map, coloured geologically, demon-
strates the extent of its application in explaining the irregu-
larities of surface. The chalk hills, oolitic hills, &c. alter-
ating with vales of clay, in all the southern and eastern
parts of England, give to those parts characters far more
important than the undulations connected with river
channels.

Similarly, hills and valleys, in which rocks of unequal
power of resisting watery action appear, show the force and
continuity of this action by the prominence of the hard
rocks and the softer masses. Thus, in Fig. 2, we see on the breast and edges of a hill
decomposed of limestones, sandstones, and shales, the especial
prominence of the limestones; and where these cross a

valley, each limestone edge is the place of a waterfall. By
studying in such valleys the manner in which the actual
stream wastes the hillside, we can safely assure ourselves of
the truth of the general explanation offered above. In Fig.
3 is a section of a waterfall, showing the edge of limestone

(o), over which the water falls, and under it a bed of
sandstone (b) little wasted, but at the bottom a body of shales which has perished by the dampness and spray, and
is excavated in a remarkable manner.

Just such an action is observable on similar cliffs by
the sea, and in each case the same effect follows: the falling
of hard rocks in lower strata and the waste of clay, as in the
upper, is due to the differential action of the atmosphere,
and the position of a waterfall is daily displaced, and is moving up
the stream—as the Falls of Niagara and Hardrow Force are
known to have done. (Leyl, Principles of Geology.) Into
all these effects of waste on the earth’s surface rain enters
for something important. Few surfaces are left untouched;
and thus the individual features of hills and valleys, the
ranges of high and low ground, and the outlines of land and sea, appear to be
effects impressed by subterranean movements and fractures of
the earth’s crust, modified by the action of the sea on
materials of unequal resisting power, while they were be-
low, and while they were rising through its waters, and by
the subsequent mechanical agencies of rivers, rains, and
chemical forces excited by atmospheric variations. [Geolo-
gy.]

SURGONS, COLLEGE OF. The present College of
Surgeons of London had its origin in the Company of
Barber-Surgeons, which was incorporated by royal charter
in the first year of Edward IV. The connection between
the practice of barbers and of surgeons commenced in
the custom of employing the former to assist in the use
of baths, in the application of ointments, and in various
other surgical operations performed by the monks and
Jews, who, from the tenth to the twelfth centuries, were
almost the only practitioners of the healing art. In 1163
the Council of Tours having prohibited the clergy from un-
dertaking any bloody operation, the practice of surgery fell
into the hands of the barbers and the smiths, of whom the
former soon became by far the more important class.

By the charter of 1 Edward IV., the barbers practising
surgery in London, who had before associated themselves
in a company, were legally incorporated as the Company of
the Barbers in London, and received authority over all others
practising the same arts in and about the metropolis. Their
authority extended to the right of examining all instru-
ments and remedies employed, and of bringing actions
against whoever practised illegally and ignorantly; and
none were allowed to practise who had not been previously
admitted and judged competent by the masters of the
company.

This charter was several times confirmed by succeeding
kings, but in spite of it many persons were associated in
company, and act as members of a separate body of
the surgeons of London. In the 3rd it was enacted, 'that no person within
seven miles of the same, shall
exercise or occupy as a physician or
first examined, approved, and admitted by the bishop of London or by the dean of St. Paul's for the time being calling to him two doctors of physic, and for surgery other two doctors of physic, all under thirty years of age; and the obtained licence to practise were of course equally qualified, whether members of the company of barbers or not; and in the 32nd year of Henry VIII. the members of the latter company, and those who had incorporated themselves as the former company in 1588, were united by the company 'for the name of masters or governors of the mystery and commonly of barbers and surgeons of London.'

By this act the united body were granted all the privileges of the Barbers' Company. A charter granted by James I. gave to the company an exclusive right of practising within three miles of London; and another, granted by Charles I., proposed to exclude every person from practising surgery in or within seven miles of London, unless after an examination by the examiners of the company. The act of the third year of Henry VIII. was not repealed, and the members of the company were obliged to obtain the testimonials of the ordinaries before they could lawfully practise either within the precincts of London or in the other dioceses of the kingdom.

In the 18th year of George II. an act was passed by which the union of the barbers and surgeons was dissolved, and the surgeons were constituted a separate company, having by this time attained to be practitioners of a scientific art, which ten years before was an art in an advanced state. By this act the company of surgeons was granted all the privileges which the previous united company had enjoyed by virtue of 32 Henry VIII., and the letters-patent of Charles I., &c. It therefore virtually repealed the ecclesiastical and civil privileges of the former company.

By the act the company of surgeons was granted the right of exclusive practice within London and Westminster and seven miles around, and the privilege of practising in every part of the kingdom. But it was also granted the right of examining surgeons, and members of the company the right of exclusive practice within London and Westminster and seven miles around, and the privilege of practising in every part of the kingdom. But it was also granted the right of examining surgeons, and members of the company the right of exclusive practice

Willox, On the Laws of the Medical Profession

by the death of the master on the day of election, and their consequent incapacity of electing a successor. Its affairs however were as regularly carried on as if its constitution had not been affected by this act. In the 3rd year of George II. a charter was granted by which it was confirmed in all the privileges which had been conferred upon it by the act of George II.

By this charter the title of the Company was altered from that of the masters, governors, and comonmony of the Art and Science of Surgeons to that of the Royal College of Surgeons in London, which it now bears. It is governed by a council or court of assistants, consisting of twenty-one members, of whom ten are elected by poll on the admission of any one of the council, by a master or an ordinary, and two are annually chosen vice-presidents or governors. By the bye-laws which the council were empowered by the charter to make, the members of the council are to be chosen annually. The members of the council are to have the first call on the joint funds of the College when the practice is confined to surgery, and are to be elected by ballot at a meeting of the council. The rules generally followed, though not necessarily to be observed, is to elect in order of seniority those of the class of members just mentioned who possess a considerable professional reputation and reside in London. The examiners are generally chosen in order of seniority from the members of the council: the presidents and vice-presidents are chosen in rotation from the court of examiners, the president for the current year having been the senior vice-president during the past year.

The members of the College are admitted by diploma after examination before the court of examiners, and their diplomas confer upon them the right of practising surgery in any part of the British dominions.

The council of the College have at various times required certain qualifications of age, education, &c. from candidates for admittance. The regulations issued (October 1841) require candidates—1st, to be not less than twenty-one years old; 2nd, to have been engaged in the acquirement of professional knowledge during not less than four years, six months of which shall have been occupied in the study of the principles of surgery during the twelve months or surgery at a recognized hospital or in the United Kingdom. three months vacation being allowed in each year; and, 3rd, to have studied anatomy and physiology by attendance on lectures and demonstrations, and by dissection, during three annual seasons (each continuing from October to April inclusive), and to have attended two courses of annual examinations in each of the three years. The examinations each in surgery, and one course of seventy lectures on each of the following subjects, viz. the practice of physic, materia medica, chemistry, and midwifery with practical instruction. These rules however apply only to candidates who have previously been allowed to sit for examination. All barbers and licentiates in surgery of any legally constituted College of Surgeons in the United Kingdom, and graduates in surgery in any university requiring residence to obtain degrees, are admitted for examination on producing their certificates of having obtained a degree from a College of Surgeons other than in London or Westminster, or within seven miles thereof, and illegal for anyone but a member of the College, or one licensed by the ordinary or vice-general of his diocese, to practice surgery in the United Kingdom, yet the College has never prosecuted any one who has practised without possessing either of these titles. The only real privileges of the members of the College therefore are, that their diplomas qualifies them for examination before the army, and navy, and East India Company's medical boards; that they have access to the library, the museum, and the lectures at the College; and that in the majority of cases they alone are eligible to hold surgical appointments in public and charitable institutions.

Nevertheless the diplomas of the College of Surgeons is regarded as essential to the respectability of all those medical practitioners in England who do not practise as physicians. The present number of members is rather more than 12,000, and about 2,000 are examined annually.

According to the last financial statement (June, 1841), the receipts of the College for the previous year were as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount (£ s. d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Court of examiners: fees for</td>
<td>12,761 14 0</td>
</tr>
<tr>
<td>22 annually exclusive of the</td>
<td></td>
</tr>
<tr>
<td>cost of stamps</td>
<td></td>
</tr>
<tr>
<td>Rent</td>
<td>37 10</td>
</tr>
<tr>
<td>Fees on admission to council</td>
<td>105 0</td>
</tr>
<tr>
<td>and court of examiners</td>
<td></td>
</tr>
<tr>
<td>(20 guineas each)</td>
<td></td>
</tr>
<tr>
<td>Fee on certificate of diploma</td>
<td>5 5</td>
</tr>
<tr>
<td>Incidental, sale of lists,</td>
<td>39 13</td>
</tr>
<tr>
<td>catalogues, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Dividends on investments in</td>
<td>1,299 4 0</td>
</tr>
<tr>
<td>government securities, &amp;c.</td>
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</tbody>
</table>

£14,158 6 4

And the disbursements were as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount (£ s. d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>College department, including</td>
<td>8,637 15 7</td>
</tr>
<tr>
<td>council, court of examiners,</td>
<td></td>
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<tr>
<td>auditors, diplomas, college</td>
<td></td>
</tr>
<tr>
<td>prize, salaries, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Museum department, including</td>
<td>2,923 5 11</td>
</tr>
<tr>
<td>catalogues, specimens, spirit,</td>
<td></td>
</tr>
<tr>
<td>salaries, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Library department, including</td>
<td></td>
</tr>
<tr>
<td>the purchase and binding of</td>
<td></td>
</tr>
<tr>
<td>books, salaries, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous expenses, taxes</td>
<td>278 0</td>
</tr>
<tr>
<td>rent, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Studentships in anatomy</td>
<td>192 7</td>
</tr>
<tr>
<td>Repairs of rooms, repairs of</td>
<td>236 12 11</td>
</tr>
<tr>
<td>Hunterian oration, lectures,</td>
<td></td>
</tr>
<tr>
<td>Jacksonian prize, &amp;c.</td>
<td>59 17</td>
</tr>
</tbody>
</table>

£10,994 9 3
The museum of the College consists of the collection made by John Hunter [Hunter, John], which was given in trust by government, who purchased it for 15,000l., and of numerous additions made to it by donations of members and others, and by purchase of the human body. It is probably the most valuable collection of the kind in Europe. It is open to the members, to the trustees of the Hunterian collection, and to visitors introduced by them on the first four ordinary days in each week; also to students of the Royal College of Surgeons and the licentiates of the Royal College of Physicians in London, to peers and members of parliament, to the great officers of state, and of the royal household and their immediate deputies, to all the dignitaries of the church and of the law, to students and Fellows of colleges, and to all learned and scientific bodies in the United Kingdom, to the members of all the public boards, and to persons introduced per-sonally by them respectively.

One student in anatomy is usually appointed annually, at a salary of 100l. per annum. They are chosen after examina-
tion by the museum committee. Candidates must be members of the College under twenty-six years of age. Their office is to assist the conservators of the museum in the preparation and dissection of specimens, and in other parts of their duties. At the end of three years' service they are eligible for assistant-surgeons in the army, navy, or East India Company's service; one such appointment every third year in each of the three services having been previously made by the disposal of the president and council of the College.

Lectures on anatomy, for which 510l. were left to the company of barber surgeons by Edward Arris, and 162 per annum by John Gale, are delivered here in the month of July. A member of the College or some other member selected by them. Twenty-four museum lectures are also, in compliance with the deed of trust, annually delivered by the Hunterian professor, the subjects of which must be illustrated by dissections. They are delivered from the other contents of the museum. And an oration in commemoration of John Hunter, or of others who have been distinguished in medical science, is delivered annually on the 14th of February, the anniversary of Hunter's birth.

Abstracts of the several acts and charters relating to the College of Surgeons may be found in Wilcock's 'On the Laws relating to the Medical Profession,' London, 1830, svo, and in Parke and Fonblanque's 'Medical Jurisprudence,' vol. iii. The bye-laws, the list of members, the catalogues of the museum and library, &c., are published by the college.

In the article Anatomy some account is given of the manner in which the study of that science was at that time practiced. The dissection of the human body was made the subject of an act of parliament (William IV., 2, 3, c. 75), of which an abstract may be very appropriately placed here.

By this act, which is intituled 'An Act for regulating the Anatomy in England,' it is enacted that the home secretary or state in Great Britain, and the chief secretary for Ireland, may grant licences to practise anatomy in Great Britain and Ireland respectively to any person lawfully qualified to practise medicine or surgery in any part of the United King-

dom, or to any teacher of anatomy, medicine, or surgery, to any student attending any school of anatomy (sec. i.).

The secretary of state or chief secretary, as the case may be, is to appoint not less than three inspectors of places where anatomy is practised. Any one who practises anatomy without being an inspector, or who may be re-appointed or removed by the secretary (sec. ii.), and whose districts of superintendence are also to be determined by the secretary (sec. iii.).

The inspectors are to make quarterly returns to the secre-

tary of state of all the bodies practised in their respective districts (sec. iv.), and to inspect, at any time, any place in which anatomy is practised within the same district (sec. v.).

Any executor or other party having lawful possession of any dead body, with which he has not been intrusted for the purposes of anatomy, may permit that body to be anatomically examined (i.e. dissected), unless the deceased have been known to express, either in writing at any time, or verbally to two witnesses during his last illness, a desire to the contrary. No one shall require the body to be buried without such examina-
tion (sec. vii.). If any person, either by writing at any time, or verbally as aforesaid during his last illness, shall direct his body to be examined after death, or nominate any person licensed under this act to make such examination, and if before the burial of the body such direction be made known to the party having lawful possession of it, he shall direct the examination to be made by the person nominated, unless the deceased person's nearest known relative, or any one or more of such person's nearest known relatives, being of kin in the same degree, shall require the body to be interred without such examination.

No body may be removed for anatomical examination from the place where the person died unless forty-eight hours have elapsed from the time of death, nor until after twenty-four hours' notice given after death to the inspector; or if an inspector be not appointed, to some physician, surgeon, or apothecary near the place of death—nor without a certificate stating the cause of the person's death signed by his medical attendant—or if he had no such attendant, by one called in after death to view the body, but who shall not be concerned in examining the body after removal: such certificate to be delivered with the body to the party receiving the same for anatomical examination (sec. ix.).

Any person licensed to practice anatomy may, under these regulations, receive or possess any body for anatomical examination (sec. x.). On receiving it he must also receive with it the certificate as aforesaid, and this he must, within twenty-four hours after the removal of the body, transmit to the inspector, together with a return stating at what day and hour the body was shown the body and its place, and the name and rank of the deceased, the place and date of place of death, the sex, and (if known) the christian and surname, age, and last place of abode; and he must enter the same, with a copy of the certificate, in a book kept by him for that purpose, and to be produced whenever the require may demand (sec. xi.).

No party may receive a body at any place for anatomical examination unless he, or the owner or occupier of that place, or some party licensed under this act to examine bodies, have given an account of it to the home secretary or chief secretary of state or the chief secretary, as the case may be, of the place where it is intended to practise anatomy (sec. xii.).

Bodies must be removed in decent coffins or shrouds, and persons receiving them must make provision for their decent burial after examination (sec. xiii.).

No licensed person can be prosecuted for receiving or having in his possession any body which he has received according to the provisions of this act (sec. xiv.). The bodies of murderers are not to be dissected after execution, and the said inspectors shall be entitled to enter into the precincts of the prison, as the court before which they were tried shall order.

Any person offending against this act is deemed guilty of a misdemeanor, and may be imprisoned for any time not exceeding three months, or be fined not more than fifty pounds, at the discretion of the court before which he is tried.

SURIYA SIDDHANTA. We had intended, under the title of this Hindu work, to have given some account of the astronomy of that nation, but we find the question so mixed up with that of their other science, that we prefer to consider it all together under the head VIGRA GAITA.

SURIANA/C.E., A small natural order of plants formed by Lindley, and placed in the Gymnosperm group of Polyple-
talous Exogens. The calyx is 5-parted, slightly imbricated; petals 5; equal; stamina indefinite, hypogynous, with round anthers, bursting internally with 2 longitudinal fissures; ovary spheric, 5-locular, 5-seeded; fruit a capsule, exo-

ubinuous, abaxial. The species are woody plants, with alternate leaves without stipules, epicate jointed hairs, and racemose flowers. These plants are closely allied to Coriariaceae and Geraniaceae. They are found in the warmer parts of the eastern South America, the Canaries, the South of Europe, New Caledonia, New Holland, and India. Lindley refers to this order Heterodendron and Cheuraum, but they are doubtless occupants of this position; Suriana/C.E. being the only order or family of this name in South America. This genus was named after Joseph Donat Surian, who was a physician and botanist of Marseille, and was the companion of Plumier in his travels in South America.

SURINAM. [Guiana, Dutch.] SURNAMSE [French.] SURPLICE, the white dress worn by the clergy in their acts of ministration, from the Latin superilceus.
Palmer says it is by no means improbable that the surrender was an instance, not different from the alb; in fact it only varies from that garment even now in having wider sleeves. The inferior clergy were accustomed to wear the alb at divine service, as we find by the council of Narbonne (A.D. 589), which forbade them to take it off until the Liturgy was ended. Probably it was then advisable to make a distinction between the dresses which the superior and the inferior orders of clergy wore at the Liturgy, and then a difference was made in the sleeves; and from about the twelfth century the name of surplice was in general and was used to denote the dress worn by the clergy. It was the custom to wear the surplice with a cope, and above the rochet. (Bona, Rerum Liturg., lib. i., cap. 24, sect. 20; Wheatley’s Illustr. of the Book of Com. Pr., svo, Oxst., 1810, pp. 100, 101; Howman, Surplice, vol. ii. pp. 319, 330.)

**SURRENDER.** *Sursum reddito* properly is a yielding up of an estate for life or years to him that hath an immediate estate in reversion or remainder, wherein the estate for life or years may be divided by mutual agreement between them. (Co. Litt., 338 b.) A surrender and a release both have the effect of uniting the particular estate with that in reversion or remainder; but they differ in this, that whereas a release generally operates by the greater estate descending on the less, a surrender is the falling of the lesser on the greater.

Coke mentions three kinds of surrenders: 1. A surrender at common law, which is the surrender properly so called; 2. A surrender by custom of copyhold lands or customary estates; and 3. A surrender of an improvidently taken, as of a lease newly created, and of a free tenement, to the king.

The requisites of a good surrender in deed are the following:—The surrenderor and surrendereree must be respectively persons capable in law of making and receiving the surrender; the surrenderor must have an estate in possession of the thing surrendered, and not a mere future right; the surrenderor must be the owner of the next estate in reversion or remainder; the surrenderor must have a higher or greater estate in the thing surrendered than the surrendereree, so that the latter may be said to take in possession this thing as a tenant in the same term, the estate of the surrenderor must be in his own right, and not in that of another; and lastly, there must be a privity of estate between the surrenderor and the surrendereree. (Co. Litt., ubi sup.; Viner, Abr., "Surrender.")

In writing, it does not require the solemnity of a deed (unless the tenement lie in grant), nor of livery of seisin. (Co. Litt., ubi sup.; Touchstone, 307.)

A surrender in law may sometimes take place when a surrender in deed could not be made; as in the case where a man makes a lease for years to commence at a future day. This future interest, or interest termini, cannot be surrendered by deed, because there is no reversion in which it can rest; but if the lease be made from the commencement of the term, and not at the end, it is a good surrender in law of the first. (5 Rep., 11; Co. Litt., 218 b.) The surrender in law takes place in every case where a lessee accepts from the reversioner a new lease for any term whatsoever, to commence after the expiration of the old one, so that if a lessee for life were to accept a term for years, there would be a surrender in law of his lease for life. In such a case it cannot properly be said that the previous term is merged in the reversion, unless the new lease commence immediately, but it may be implied from the supposed inconsistency of retaining the former estate, and accepting another in part concurrent with it.

A surrender may be either absolute or conditional. A grant of a lease for the reversion by a lesser for life, though it be only conditional, carries an irrecoverable merger of the term; but if a surrender has been made upon condition, an entry for condition broken eay revest the particular estate. (Co. Litt., 218 b.)

The surrender of terms of years will sometimes be presumed from length of time alone; and in many cases arisen upon the question, after what periods mortgage debts which have been satisfied, and terms which have been assigned to trustees to attend the inheritance and have not been subsequently dealt with, will be presumed to have been surrendered. A full discussion of the cases on this subject will be found in Sug. and Faw. *Surr. Estates* (vol. iii. 25 to 67, 10th ed.), the result of which may be stated to be, that where a term has never been assigned to attend the inheritance, the surrender of it may be presumed from the mere length of time elapsed without any other evidence of dealing or the question of the term which may properly be left to a jury.

A term has once been assigned to attend the inheritance, presumption of surrender ought not to be admitted unless there has been an enjoyment inconsistent with the co-existence of the term, the net has been done for the purpose of dissolving the tenor under the termor, and to bar it as a continuing interest. [Copyhold; Merger; Release.]

2. As to surrender of copyholds, see Copyhold.

3. A surrender may be made of letters-patent and offices to the king, to the intent that he may make a fresh grant of the same right; and a grant of the second patent for years to the same person, for the same thing, causes a surrender in law of the first. (10 Rep., 66.)

**SURRY.** An inland county of England, bounded on the north by Essex, from which it is separated through out by the river Thames, on the east by Kent, on the south by Sussex, on the west by Hampshire, and on the north-west by Berkshire. The form of the county approaches to an oblong quadrangle, the eastern sides are nearly regular, and the northern and western sides less so. It consists of the west, from the Kentish border near Westerham (in Kent) to the Hampshire border near Farnham, is 39 miles; the county is about 10,419 statute miles, and is about 20 miles wide; if it be measured at Blackfriars bridge, London, to the Sussex border near Crawley (in Sussex), is 25 miles. The area of the county is estimated at 759 square miles. The population at the different enumerations of the present century was as follows:—1801, 183,431; 1811, 209,389,555, increase 23 per cent.; 1831, 486,334, increase 22 per cent.; 1841, 582,613, increase 19.7 per cent. It is in the thirtieth of the English counties, being a little smaller than Wessex, and a little larger than Oxfordshire. Taking the census of 1831, there were 441 inhabitants to a square mile. It was in amount of population the fifth English county, being next below Devonshire, and next above Kent; and in density of population it stands next to the third of Middlesex, and to Cashire. Cromford, Guildford, and Kingston are both the county towns. Cromford is about 10 or 10½ miles south of the General Post-office by the coach-road, and 10 miles by Croydon railway; Guildford is 30½ miles by coach-road south of the London and South-Western railway to Woking Common, and thence by coach-road; Kingston is 13 miles south-west of the Post-office by coach-road, and about the same distance by the London and South-Western railway. Guildford and Kingston are both on the Portsmouth road.

**Surface and Geological Character.** —The part of the county which lies north of a line drawn from the Kentish border near Beckenham, leaving Croydon a little to the south, and passing by Carshalton, the Tamar, and Leatherhead, and from thence to the Hampshire border near Ash, leaving Guildford a little to the south, may be regarded as belonging, with some exceptions which we shall notice, to the London clay formation. The district is traversed by this formation, but near London it forms, however the line of hills extending on the south side of London, from New Cross near Deptford, by Nunhead, Peckham, Denmark Hill, Horne Hill, Brixton Hill, Clapham Road, and Battersea Rise, Wandleton Common, and Rye Hill, and the result is an undulating country southward along the Kentish border from New Cross by Forest Hill, Sydenham, Ponto Common, and Norwood. None of the parts of this formation, so much of which are very irregular and broken, and through which is washed by the River Norwood are 389 feet above the level of the sea. Brick-earth is obtained in the London clay district near Kingston.

North of this hill the line extends from New Cross to Battersea, the London clay is covered by alluvium; and it is probable that the greater part of this flat, was, accordingly so.
dently to the Roman period, overflowed by the river at every high tide, and formed an extensive marsh, which was gained from the river by embankment. Along the bank of the chalk marl near Puttenham and Ashtead, the London clay is covered by alluvium.

The range of high and mostly waste grounds, Esher Common, Cobham Common, St. George's Hill (between Cobham and Woldingham), Woking Heath, Purble Common, Roumping Down, and the Hampstead Heath, the north-west part of the county, and which extend with slight interruption from the neighbourhood of Kingston to the Hampshire border,—the range of St. Ann's Hill (240 feet) is quarried, and Beare Green, Bagshot Heath, extending from near the Thames to the Berkshire border,—and the high ground of Cobham Ridges between these two ranges, are all formed of the siliceous sand and sandstone belonging to the upper marine formation, which here covers the London clay. The highest elevation does not exceed 453 feet. This formation presents a poor, hungry, unimprovable sand; and hence extensive wastes are allowed to remain, notwithstanding the proximity of the metropolis and the consequent impulse to cultivation.

South of the boundary-line of the London clay the plastic clay crops out, and occupies a long narrow district extending across the country from the Kentish to the Hampshire border, bounded on the south by a line drawn between Addington, Hascombe, and Ponders End, and Guildford, and thence to the Hampshire border. The breadth of the plastic clay district on the Kentish border is four or five miles, but it becomes narrower towards the west on the Hampshire border probably not more than half a mile in breadth. The hills and escarpments of the district, at Reigate, Croydon, Banstead Downs (756 feet), and Epsom, Ashstead, and Leatherhead commons are on the plastic clay, which here covers the chalk with a thin bed; the chalk itself forms the hills and the high ground of Cobham Ridges. The fine clay of the plastic clay formation are wrought near Ewell, and red clay near Guildford. South of the plastic clay the chalk range of the North Downs rises. These downs extend from Kent across the county into Hampshire, including its western boundary, and the Thames and its tributary rivers Mole and Wey pass, and by a depression near Farnham. The southern escarpment may be traced running just to the north of Tisbury, Godstone, Merstham, Gatton, Reigate, Beithwich, Dorking, Wotton, Albury, Shalford, Puttenham, and Farnham. Guildford is in the line of the downs in the depression through which the Wey passes. The breadth of the chalk district is greater on the eastern side of the county, and the downs there attain their greatest elevation. The Kent bank, two miles south-west of Reigate, is the highest point. The breadth of the chalk district here is about four miles. Box Hill, near Dorking, overlooks the depression through which the Mole passes, and is, from the picturesque scenery which it presents, a favourite place of residence. It is 875 feet above sea-level. The Downs to Dorking and Guildford the range of the downs gradually narrows; and between Guildford and Farnham it forms a remarkable narrow unbroken ridge, above six miles long and about half a mile broad, called the Hog's Back. The downs rise again beyond Farnham just on the border of Hampshire, into which they extend. The thickness of the chalk formation at Denbigh, north-west of Dorking, is 440 feet. The dip of the strata east of Guildford rarely if ever exceeds 15°; in the ridge of the Hog's Back it is 45°. The chalk is dug in different places and is burnt for lime.

From beneath the south escarpment of the North Downs the chalk marl and green-sand formations crop out. They occupy the valley between the south foot of that escarpment almost all through the county, and which valley east of Reigate is called Holmesdale; but as the formations extend southward from the chalk they rise into hills, extending south of Limpfield and Godstone by Betchingley, Nutfield, and the green-sand hills of Godstone and Chiddingfold; and south-west with Holmwood Common, Leith Hill (993 feet), the highest point in the county, and indeed in this part of England), Hurtwood Common, on which are Holmbury and Conomhurst hills, Hascombe and Hambledon, to Hind Head Common (995 feet), and then to the north-west of Dorking and Farnham. The range of hills presents a bold escarpment towards the valley on the south, and is crowned by two considerable depressions, one near Reigate, by which the Mole passes through, and another between Hurtwood Common and Hascombe, through which a feeder of the Wey passes; and by some minor interruptions. Beds of chert occur in the chalk marl near Farnham, and the purple and green sand is dull in the same formation at Merchiston. Flint and chalcedony occur commonly in the green-sand: in which also fullers'-earth beds occur at Nutfield, and crystalized sulphate of barytes of a yellow colour. The high grounds of these formations are all almost entirely waste. On Hind Head Common occurs that remarkable hollow, the Devil's Punch-bowl, round which the Portsmouth road winds for nearly a mile.

The rest of the county, comprehending the whole of the southern border of the county and a very small part of Haslemere, is occupied by the Weald clay and its formations. The latter only just appears at the south-eastern corner of the county, and will scarcely require notice. The Weald clay occupies the broad valley at the foot of the green-sand hills, and in some places forms the lowlands of the south side of the hills. Brick-earth is dug in this part of the county, between Red Hill and Horley. It is said that have been wrought in the iron-sand formation in this county and in Sussex.

The green-sand hills and the part of the county south of them are included in the Weald district of Kent, Surrey, and Sussex.

Hydrography and Communications.—The county is included in the basin of the Thames, except three very small portions, which are drained to the Medway. The county is drained by streams flowing into the Arun, and a third in the south-eastern corner of the county, which belongs to the basin of the Medway. The Thames, which forms the northern boundary, is navigable throughout for small craft, and up to London Bridge for large vessels. The Arun branches which belong to Surrey are the Bourn brook, the Wey, the Mole, the Hog's Mill river, the stream which joins the Thames above Putney, and the Wandle. The Bour-gallery, Betchingley, and flows by Chobham and Addlestone into the Thames between Chartsey, sending off one branch into the Wey; it receives a stream from Virginia Water in Windsor Great Park: its whole length is about 14 or 15 miles.

The Wey rises at Selsdon, in Surrey, and flows north-west nine or ten miles to the border of Surrey, which it enters not far from Farnham. From the border of the county it flows first north-east and then south-east by Farnham, six miles to Tilford, where it receives, on the right bank, a considerable stream from Woolmer Forest in Hampshire, and runs eastward seven miles to Godalming, where it becomes navigable. From Godalming it flows four miles north by east to Guildford, receiving by the way on the right bank the streams of the Leith and the Mole. They flow the south side of Hurtwood Common, and has a circuitous course of 15 miles, chiefly through the Weald clay valley, passing northward by a depression in the green-sand hills; the other rises on the north side of Leith Hill, and flows northward to Godalming, passing near the river valley between the North Downs and the green-sand hills. From Guildford the Wey flows in a winding channel north by west by Woking, about 14 miles, into the Thames at Weybridge. At Farnham, below Woking, it receives on the left bank a stream 12 miles long, which rises on the north-east slope of the Hog's back, and at Weybridge one nine miles long, which rises on the northern slope of the North Downs between Leatherhead and Guildford. The whole length of the Wey is about 41 miles, for about 18 of which is navigable.

The Mole rises in the northern part of the county of Sussex. The principal source is near Hand Cross on the Brighton road, and it flows northward about five miles to the border of Surrey, which it enters near Horley, and then flows still northward past Horley, five miles to Kennerley Bridge, two miles south of Reigate. Just above Kennerley Bridge it turns north by west, and flows six miles to Dorking through the valley between Hascombe and Cobham, and then joins the Thames at Weybridge. From Dorking the Mole winds northward through one of the most picturesque and beautiful parts of the country to Leatherhead, five miles following the channel of the river; and from Leatherhead it runs north-west five miles to Cobham, and then flows past the three sides of a small quadrangle, flows northward or rather north-north-east into the Thames at Epsom, opposite Hampton Court. Its whole course may be estimated at 43 miles. It is not navigable in any part.
penetrating through the chalk range of the North Downs at the
foot of Box Hill near Dorking, the Mole is subject to be
occasionally absorbed by the spongy and porous soil
through which it flows. There are probably caverns
and hollows which communicate with the bed of the river,
and which in ordinary seasons are filled with water; but
when in time of drought the water which the torrent contains is absorbed,
the river is drawn off into them so as to leave the channel
dry at Burford Bridge under Box Hill, and for some distance
below it except here and there a standing pool. At Thornto-
bridge, near Leatherhead, the stream rises again; and
below that point suffers no interruption. From the occa-
sional occurrence of this phenomenon, the accounts of
which have been much exaggerated, the river is supposed to have
obtained the name of Mole; its more ancient name, at least
in the upper part of its course, appears to have been Ewhell.
The name Mole is however old as the Anglo-Saxon
period, for Molehams (or Moutse), which is evidently
derived from it, is mentioned in 'Domesday.'

The Hog's Mill river rises in a copious spring in the
village of Ewhell, and flows north-west seven miles into the
Thames at Kingston. It is not navigable, but turns several
mills. The stream which joins the Thames near Putney
rises at the foot of Banstead Downs near Cheam, and flows
northward by Coube Wood, Richmond Park, East Sheep-
and Lamberts, where it turns east and joins the Thames half
a mile above Putney Bridge: its length is almost 10 miles:
it is not navigable. The Wandle rises near Croydon, flows
three miles west to Carshalton, then turns and flows eight
miles north-north-west by Mitcham, Merton, Garret, and
Wandsworth, into the Thames: its course is only 11 miles,
and it is not navigable, but few rivers are made more useful
for supplyng mills of all kinds.

The principal roads in the county are those which lead
from the metropolis to the south-east, south, and south-west.
The Dover road, as far as New Cross, near Deptford, is
in this county. The Brighton road runs south from South-
walk through Kennington, Brixton, Streatham, Croydon,
and Mersham. Here it divides, one branch running along
the Reigate and Brighton road, and the other, the Red Well and
through Horley. The two branches unite near Horley.
and run across Lowfeld Heath to Crawley in Sussex. The
old Reigate and Brighton road appears to have passed, not
through Brixton, Streatham, and Croydon, but through
Clapham, Tooting, Mitcham, and Sutton, and over Bansted
Downs. The Lewes and Eastbourn road branches from the
Brighton road to the left a little before Croydon, and
passes through Godstone. The Horsham and Worthing
road branches from the Brighton road to the right at
Kirtlington, and passes through Clapham, Tooting, Merton,
Morden, Ewell, Emepson, Leatherhead, and Dorking.
The most frequented Portsmouth road leaves the metropolis
at Hyde Park Corner, and enters the county over Putney
Bridge, but formerly the more frequented part of the road
was through Southwark, Newington, and Wandsworth. The two roads
unite beyond Putney, and run south-west by Kingston,
Egber, Cobham, Ripley, Guildford, Godalming, and Mouse-
hill. The Winchester and Southampton bassin lies in
this from the right to Guildford, and runs west along the
Hog's Back to Farnham. The Chichester road branches from the
Portsmouth road to the left near Moushiull, and
turns by Halesmore. The Salisbury and Exeter road enters
towns, and runs just parallel to it through

making this canal was obtained a.d. 1801, but it was or-
iginally intended to carry it eight miles farther to Mole-
ham. Its length is four miles, almost entirely in this
county. The Wey and Arun Canal, sometimes called the
Surrey and Sussex Canal, commences in the river, Way near Sheld.
between Guildford and Godalming, and runs south by east
northwards, as far as Arundel, where it enters the
Sussex Canal, which is about 23 miles long, and has
been made entirely in this county: the capital raised was
1,580,000£. The line is designed for passengers and goods; and locomotive
engines are employed. The Gosport Branch railway
which runs from this line to Gosport, is wholly in Hampshire.

Agriculture.—The climate of this county is favourable
for corn and grass. Along the Thames and the other rivers

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the county the air is soft and mild; where the ground rises into barren gravelly hills, or lies on the range of chalk which divides the county in a direction from north-east to south-west, from Croydon to Farnham, it is keen, and the winds are more boisterous. But hardy plants and robust constitution are neither impaired by it than other places. The next in order varies greatly in different districts. The richest is that which lies along the banks of the rivers, consisting chiefly of a deep alluvial loam. On this soil, in the neighbourhood of London, are some of the extremely productive and highly esteemed gardens which yield profuse and abundant crops of all polis with fruit and vegetables. The immense quantity of manure which is annually laid on the land so occupied, and the deep trenching and digging which are repeated at short intervals, have converted the whole surface, to the third or fourth inch below the soil, into a black velvety mould. On this soil are raised the best and earliest cultivated vegetables, which so rapidly succeed each other, that five or six different crops are sometimes gathered from the same ground in one year. There is another rich black soil, which appears in small detached portions along the foot of the chalk hills. Although this soil requires great attention in its tillage, owing to its hardening in dry weather and being very soft and muddy when wet, it produces fine crops of wheat. The usual rotation is, six horses, the next year, is ploughed up in continuous strips, and is turned over in solid masses as if it were soap. In its natural state this soil is of little value, and can only be rendered productive by very complete draining, and by correcting the tendency by various means to the chalking which is chiefly on this soil, which however is seldom the case. The Weald is generally low and flat; where it rises into hills the soil is more fertile. In the northern portion of the county extending towards Hastings, there is a large tract of sandy loam. Some of these qualities, some of which remain to this day in the north of heath and commons. There are some sandy loams of a better quality between the barren soil known by the name of Bagshot sand and the chalk hills, as about Esher, Dorking, and Reigate: about Godalming it becomes of a very good quality, resting upon a sandstone. The poorer sands rest chiefly upon a yellow ferruginous gravel. The tops of the chalk hills are either covered with a short pasture, as downs, or, where the soil is deeper over the chalk, it is used for grazing sheep. Surrey is a favourite county for the residence of men of fortune. It possesses many beautiful sites, and the views from some of the hills are very extensive, such as Richmond Hill, St. Ann's, Cooper's Hill, and from both of these, within a short distance from London are very numerous, but few of them have more than a small quantity of pastureland and pleasure-ground attached to them. Within a certain distance from London the larger properties have been mostly subdivided, and their value greatly increased from the competition of purchasers. Where land is held as an investment or inheritance, the rent is low, and the farms are not often let so as to encourage the tenant to lay out any capital. Where the tenure is from year to year, the state of the land is equal to the value of the crop; and the failure of the landlord; and he is only restricted in his mole of cultivation by the custom of the country, than which nothing can be more vague. Two or even three white crops in succession of this kind of custom in the same place, provided the land had been fallowed and mazoned.

Where leases are granted, the conditions are often absurd and contrary to the principles of all improved husbandry, if they are not even contradictory and impossible. The most common is that the tenant shall keep the land in drain-holding, or chalking their land; and who, by granting leases on fair terms, get respectable tenants with sufficient capital to cultivate the land pro-

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sake the straw of the wheat and oats would produce an insufficiant portion of manure for the land, and that of a very inferior quality. The beans are carefully hoed by hand, where there is any pretension to good farming. Some old-fashioned farmers, especially among the small occupiers, adhere to the old course of fallow, wheat, oats, laying on all the manure they may make on the fallow for the wheat. The appearance of the land will readily show where this is the case, without asking a question; and the poverty of the farmer proves how unprofitable it is to the tenant, as well as to the landlord. On the chalk soils, where there is a strong reddish clay, which the chalky subsoil protects from intense heat, wet, turnips are added to the foregoing course, or rather the Norfolk course alternates with it, thus:—fallow well ploughed and stirred and folded with sheep; wheat, beans, oats, turnips dunged, barley, clover, oats or wheat, according to the fertility of the land. Peas are sometimes substituted for the beans, and tares made to precede the oats. There is no great fault to be found with this system, provided attention be given to have a sufficient quantity of manure, either from sheep fed on the downs and fattened at night on the land, or by the stall-feeding of cattle. Without the advantage of the downs to feed the sheep, or grass-land attached to the farm, a proper quantity of manure could not be made. On all the good sandy loams the Norfolk course is universal, with occasional peas or beans, which are found useful in that county. [NORFOLK—Agriculture.] The poor barren sands have been rendered productive in some spots by trenching and judicious planting. Where the iron pan, as it is here called, or the moor-land, which is an almost invariable indication of the heath, is best, as through, trees thrive well; where this is not done, planting is generally a dead loss. In the midst of the most desolate heaths in the county a cottage is sometimes erected by some poor landlord, with the consent of his parish, or by taking the quiescence, with a garden in which fruit-trees grow and good vegetables are produced. This has been chiefly effected by deep digging, manuring with scrapings from roads and the ashes of the turf which serves for fuel mixed with the manure of the pig, which is littered with dung; hay, grass, and clover, is sown from the common. This shows that the soil is not irreclaimable; and it requires only the labour and care which are stimulated by necessity to convert these barren heaths into productive land. They are by no means so unproductive as some of the Dutch and Flemish heaths, which are now in full cultivation. [BARREN LAND; FLANDERS—Agriculture.] We have mentioned sainfoin as a plant grown with great advantage on the chalky soils of this county, where it thrives very well. It is the hay which is the most essential article of its roots. It is usually sown with barley, as is the practice with clover, with this difference, that the land is ploughed deeper in order to loosen the chalky subsoil, into which the roots of the sainfoin strike to some depth. Some farmers sow trefoil at the same time; but the best farmers do not approve of this. The sainfoin alone will cover all the ground, and give a greater weight of fodder, whether green or made into hay, than the mixture; and the trefoil seems to act as a weed to the sainfoin, and to check its growth. As grass and weeds are great enemies to sainfoin, the land should be quite clean when the barley is sown—as it should at all events—that the sainfoin may choke the weeds and keep possession of the surface. It will bear a long continuance of dry weather without looking sickly, which is owing to the depth to which the roots grow. Sainfoin may also be sown before winter, if the soil is prepared; and in that case it is well to give it the whole surface of the land without any other crop. In the course of its continuance, which may be five or six years or more, the loss of order to have a to be so strong to be much room for weeds. The per acre. When the most of the plants cannot get a foot above the earth, in this case the land, and it in the success— it may be invi- gated by top-dressing. The liquid manure, which is col- lected in tanks, and consists of the urine of stall-fed horses, and the droppings of dung-hills, is the most effective re- cruiter of the soil. In Switzerland, where sainfoin is grown abundantly on the chalky slopes at the foot of the Jura Mountains, the inhabitants carry this liquid in flattened conical tubs slung on the back of the whole party rising above their head; and distribute it by pouring it over the sides of the tub, right and left, by a peculiar scoop and jerk. One would suppose this to be a very slow and laborious process; but where cattle could not well go, owing to the nature of the surface, the surface manuring render this liquid manure is only mentioned here to prove how valuable a top- dressing it is found to be. It is in a very concentrated state, and usually put on in rainy weather, or in the evening, to prevent burning. If a cart-load of manure is put into the well and still fill a large cart, it would be found to have imparted all its richness to the water, and left only insoluble fibres of straw behind. This quantity of liquid manure is as easy of carriage as a cart-load of dung, and would invigorate a much greater extent of ground than if the solid manure were carted on and allowed to dissipate, in a great measure, before it is washed in by the rains. This is only anticipating what the rain will do less effectually, and avoiding the disappointment caused by dry weather. Ashes are of little use; and the use of sainfoin. Peat and wood ashes are the best, no doubt, but coal-sashes, which may be obtained in larger quantities, have also a very good effect when well sifted from cinders. Gypsum has been used with advantage; but it is not yet known how it acts. In other places as in others it seems to do wonders. Top-dressing not only pro- duces a greater crop, but keeps the plant in vigour for a longer period when it begins to get thin; and as the expenses of top-dressing are trifling, and the advantage of the longer the field can be made to produce a good crop before it is broken up again, the greater the profit. To say that sainfoin does not exhaust the soil at all may perhaps not be warranted by theory or practice; but as it draws its nourishment from the surface, and does not make the roots derive their mostly from the surface, it is reasonable to conclude that sainfoin exhausts this latter less, in proportion to the produce, than any other of the plants usually cul- tivated, lucern not excepted; for lucern requires a good staid soil to flourish in, and to enable it to last as many years as the sainfoin. In making sainfoin hay great attention must be paid to the weather. It has a hollow stem, which in long continu- ance of wet weather becomes filled with water: in this case the hay is of little value, and the roots become musky in the stack and being entirely spoiled. In very dry climates there is no fear on this account; but in our moist climate this is a serious evil. The situations in Surrey where sainfoin is most used: has the soil rich and deep, and the winds. If the proper time be chosen for making sainfoin into hay, which is when the flower is first beginning to fade, and the swarth be often turned without any treading or spreading about, and soon made into small cocks, there will be no great danger of the staim being soaked with wet, even by very heavy showers. It must be left till quite free from moisture or sap before it is stacked, or it will become mouldy or heat dangerously, as the water or the sap prevails. Well get up sainfoin hay is nearly equal in value to clover hay, and much more nutritious than the best meadow hay. It is especially good for fast-working horses, as it affects the wind less than clover. Lucern and sainfoin hay are generally con- sidered on a par, when equally well made. But the most is to be made of the latter of these plants, which is a very early crop, and is well cut green, just as the flower opens, and is given to horses and cattle in that state. One of the greatest enemies to the duration of a sainfoin hay is the oat-grass, which im- mutes itself and ultimately thins the plants so much as to force the farmer to inter- pate, and the ground ploughed and cleaned before the weeds have gained the mastery; for in that case it is difficult to eradicate them. When a field of sainfoin is broken up, it should not be sown again at least as many years as the sainfoin has lasted, or it will probably fail of giving such a crop as will keep down the weeds. There are some exceptions, at least it is so stated in books, where the land, being thoroughly cleaned by following, sainfoin has been sown again imedi- ately with success. But we would not recommend the
practice: it is better to choose another field, and let the sainfoin go the round of the chalky fields in succession: the crumb which is left to raise corn, which, within little more than a century, the weeds did not produce in sufficient supply for the inhabitants, although the population was small. At present the woods have been greatly thinned, and the process of grubbing has gone on most rapidly. It has been found that the underwood, with a few trees interpersed, if properly taken care of, is more profitable than an open wood of thriving oaks, which have a slow growth and give a distant return, while the coppice is a rapid return, which is sooner produced. Hence the management of underwood has been well attended to. The woods are kept dry on the surface by numerous open drains in the tenacious clay. The shoots have been plashed and laid down to take root where there supposed to grow, and the wood has been carefully fenced from cattle and other trespassers. The best underwood consists of quick-growing trees, as ash, elder, sallow, and willow. The oak and chestnut are more precocious, although more valuable when in perfection. The coppice, if preserved, is cut and sold by the proprietor or his agent. When it is included in a lease of a farm, from twelve to sixteen shillings per acre is an average yearly rent. When the lease is for twenty-one years, the farmer is permitted to replant the wood, and produce so much as it would at twelve or fourteen years' growth, even allowing for the rent of the surplus years. It is therefore always preferable for the landlord to keep the coppices in hand.

The new plantations which are made are either merely ornamental, near the seats of proprietors, or are on the barren sandy soil, as mentioned before.

In the heaths and poor sandier soils is often abundant, and gives some return, when cut and tied in faggots for heating houses' ovens, and for the purpose of briquetting. In some places it has been sown for this purpose, and has produced a good return at a small expense. A gallon of seed is sown per acre after the land has been cleared of heath and ploughed down, without any further operation. In the first year it may be mown, and the tops, bruised in a mill, are very good food for horses and cows. It may be cut afterwards every three years and tied up into bundles. An acre will produce from 2000 to 3000 bundles, worth six shillings a hundred delivered. This is a good return from such poor land.

There is no peculiar breed of cattle in Surrey. There is not much good grazing-ground, and the beasts that are fattened or kept for milk-cows are of all the breeds which are usually met with. Short-horn and Alderney cows, and crosses between them, are very common in the pastures adjoining gentlemen's seats. There was a small herd of pure Ayrshire cows kept at Esher by the late R. Oswald, Esq., and a cross between these and the Alderney, which were purchased from Mr. Dower, and gave excellent cream and butter. They were sold and dispersed through the neighbourhood, and the breed will probably not be kept pure. Beasts of all breeds are fattened at the distilleries near London. Oxen for draught are very seldom met with, horses being almost universally used. In the present year 7000 acres has been under cultivation, as many of the heaths and commons have been divided, although not cultivated, and the sheep have no longer their former wild and extensive range. The farmers are partial to the South Down sheep, and some prefer crosses between these and the Leicester or the Cotswold, which give a heavier fleece and larger carcass. They also bear rolling on the exposed hills. Several farmers about Ewell, Esher, and Walton, and some of Guildford, rear horned lambs for the London market. The ewes are invariably of the Dorsetshire breed, which lamb early. They are well fed and closely housed, and the sucking lambs are treated in a manner very similar to calves fattening for the butcher. The great object is to get them fit for the market as early as possible in the season.

The pigs are principally of the Berkshire breed. There was formerly a very large breed at Rudgwick in this county. The hogs, some of which gave crosses of forty and fifty score when fat, were reared on excellent bacon. But these enormous animals took a long time to fatten, consumed a large quantity of food, and the bacon was so not readily disposed of as of the smaller sorts. This is a sufficient reason for their being now nearly extinct.

The principal fairs in Surrey are as follows:

- Blechingley, May 19, Nov. 2; Chartley, first Mon. in Lent, May 14, Aug. 6, Sept. 23; Croydon, July 9, Oct. 2; Dorking, day before Ascension-day; Fareham, Holy Thursday, Midsummer-day, Nov. 13; Epsom, May 29; Esher, July 25; Ewell, Sept. 4; Ewell, May 12; Walton-on-Thames, Easter week; Godalming, Feb. 13, July 10; Guildford, May 4, Nov. 22; Haslemere, May 13, Sept. 26; Kingston, Th. in Whitsun week, 4th Nov.; Leatherhead, Oct. 30; Merton, Easter Mond., Whit. Mond.; Reigate, Whit. Mond., Sept. 14, Dec. 9; Ripley, Nov. 11; Wandsborough, Whit. Mond.

**Divisions, Towns, &c.**—Surrey is divided into fourteen hundreds, as follows:

<table>
<thead>
<tr>
<th>Hundred</th>
<th>Situation</th>
<th>Area</th>
<th>Population</th>
</tr>
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<tbody>
<tr>
<td>Blackheath</td>
<td>S.</td>
<td>49,470</td>
<td>3,561</td>
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<tr>
<td>Brixton</td>
<td>N. E.</td>
<td>30,989</td>
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<td>Coshmore Central</td>
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<td>34,730</td>
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<td>21,100</td>
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<td>S. W.</td>
<td>26,675</td>
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<td>43,735</td>
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<td>12,690</td>
<td>17,491</td>
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<td>Reigate</td>
<td></td>
<td>45,150</td>
<td>10,719</td>
</tr>
<tr>
<td>Tandridge</td>
<td></td>
<td>52,220</td>
<td>3,931</td>
</tr>
<tr>
<td>Wallington</td>
<td></td>
<td>36,470</td>
<td>24,647</td>
</tr>
<tr>
<td>Woking W. &amp; Central</td>
<td></td>
<td>52,770</td>
<td>15,993</td>
</tr>
<tr>
<td>Wotton</td>
<td></td>
<td>32,660</td>
<td>7,754</td>
</tr>
<tr>
<td>Military under training</td>
<td></td>
<td>665</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
<td>474,480</td>
<td>485,334</td>
</tr>
</tbody>
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The metropolitan boroughs of Southwark and Lambeth are included in Brixton hundred, and Guildford is included in Woking hundred.

Surrey comprehends the parliamentary boroughs of Southwark, Lambeth, Guildford, and Reigate; the new disfranchised boroughs of Haslemere, Blechingley, and Gatton; the market-towns of Croydon, Croydon, Dorking, Epsom, Fareham, Godalming, and Kingston; the suburban villages of Rusberthia, Bermondsey, Newington, Walton, Camberwell, Peckham, Dulwich, Norwood, Brixton, Kennington, Clapham, Wandsworth, Putney, Battersea, Tooting, and Streatham; and the remoter villages of Mortlake, Barnes, Ken, Richmond, Wimbledon, Morton, Mitcham, Ewell, Carshalton, Beddington, W�oughton, Leatherhead, Walton-on-Thames, Esher, and Egham. Southwark is described elsewhere [LONDON; SOUTHWARK], as are some of the other places. [BATTERSEA; BLECHINGLEY; CROYDON; FARNHAM; and LAMBERTS.]

Guildford, in Woking hundred, is situated on the right bank of the Wey, and in that depression of the North Downs through which the river passes; 304 miles from the General Post-office, London, by Kingston, or 318 by Leatherhead. The area of 54,218 acres is free from parochial and municipal limits, as determined by the Boundary and Municipal Reform Act, comprehends a much larger area. Guildford is mentioned first in the will of Alfred the Great, by whom, as being a royal demesne, it was given to Ewell Abbey, on whose rebellion or death a few years after it reverted to the crown. It was here that Alfred, the son of E beleth II., was treacherously seized in the reign of Harold I. (A.D. 1056), and here his Norman attendants were massacred to the number of nearly six hundred. In December
The town is called Guildford. It belonged to the king, who had several mansions or towns (laenas), which and other data Manning (History of Surrey) conjectures the population to have been about 700. There are the remains of an old castle here of uncertain date, but it is probably later than the Doomsday survey, as it is not noticed in that. The castle of France and its insurgent barons in the reign of John, A.D. 1216. It was alienated from the crown in the time of James I. The ruin stands on an eminence on the south side of the town, and not far from the east bank of the river. There are several remains of the edifice, and understandings:—it is a square tower, about 44 feet square outside, with walls ten feet thick in the lower story. The original entrance was through a stone arch in the west front, so high that it may have been intended by an occupier of the site. This opening, which now commonly passes for a window, has a pointed arch, which, as the general character of the keep is Norman, was probably altered at a period subsequent to the erection. There was a circular staircase in one corner, and there were galleries in the walls as at Rochester. The town is on a declivity, and the High-street, which runs down to the bridge over the Wey, is steep. The town is well paved, and lighted with gas; and from the well-built and substantial houses which it contains has a thriving and respectable appearance. Other people consider the declivity to the south of the High-street, is a curious edifice, chiefly of chalk, very antient, and rudely built. Some parts are of early English, and others of later date. It consists of four stages, and a central tower, each stage having a balustrade on each side, forming an extension of the aisles, and originally communicating with the chancel by arches which are now stopped up. These chapels do not extend the length of the chancel, and are round at the east end. There is a small embattled tower in the corner of the building. The church is near the eastern entrance of the town on the south side of the High-street. It was rebuilt of brick about the middle of the last century, with an embattled tower of the same material. High Church is on the west side of the Way. It is an antient structure, rudely built of chalk and flints, with an intermixed stone; and is of various dates and styles. It has a low embattled western tower entirely of stone, and some good lancet windows. On the north side of High-street, nearly opposite Trinity church, is Abbott's Hospital, or Trinity Hospital (erected and endowed by Archbishop Abbay, a native of Guildford), a building in the Elizabethan style of imposing appearance, built round a quadrangular court. The gateway tower is surmounted by a circular turret, and there are windows in the side walls with pinnacles. There is a grammar-school, an antient and spacious building. The old town-hall, or guildhall, is a large building, surmounted by a turret, and having a clock projecting into the street; and there are a new corn- mill and one or two very neat turrets at the corner, surrounded by walls with pinnacles. There are two banking establishments. The Midsummer quarter-sessions for the county are held here, and the sum- mer assizes are held in October. The court of election for members of parliament for the western division of the county is also held here.

The town was early incorporated, but the time is un- known; the earliest known charter is of Edward II. Quarter-sessions for the county of Guildford are held on the occasion requires. The town has, under the Municipal Reform Act, a commission of the peace, 4 aldermen, and 12 councilors. Guildford has sent two members to parlia- ment. The number of voters on the register for 1835-6 was 430: for 1836-40, 495.

The livings of Trinity and St. Mary's are rectories, united, of the joint value of £111, with a glebe-house. St. Nicholas is a rectory of the value of £124 10s. 8d., with a glebe-house. They are all in the rural deanery of Stoke, the archdeaconry of Surrey, and the diocese of Winchester.

There were in the old borough, in 1388, an instaur-school of boys, with 133 children, 76 boys and 47 girls; there was also a grammar school with 74 boys, 6 on the foundation; an endowed blue-coat school with 56 boys, 26 of them on the founda- tion; two national schools, with 64 boys and 76 girls; a Lancasterian school, with 96 girls; and ten other day-schools, with 212 children, and 260 children of both sexes. There were also two Sunday-schools, with 352 children, viz. 150 boys and 194 girls; besides which 44 boys from one of the national schools attended on Sunday. There was a grammar school in the archdean- cy of Guildford, near the town, called the General Post-office, through Croydon. The borough, which is now co-extensive with the parish, has an area of 5800 acres. This place is called Chichefello in 'Domesday,' but acquired the name of Reigate in the following century. It was a royal demesne at the time of 'Domesday,' and was afterwards granted to the earl of Warrenne and Surrey. There was a castle here, of the foundation and history of which little is known except that it was taken from Earl Warrenne by Louis of France and the insurgent barons, A.D. 1216, and afterwards fell into decay. It was afterwards converted into a ruinous appearance. There were several buildings at the end of the church, and another structure near the entrance. The town was lighted with gas. The site of the castle is on the north side of the town, behind the houses in the High-street: the site of the priory is marked by a modern mansion-house, the Priory-chapel, a barn, and a large and an ancient house at the end of the church street. The church is at the east end of the town, on a terrace of rounded square, with a church of stone, probably from the neighbouring quarters, and is chiefly of perpendicular character, with some good windows, and a lofty embattled tower at the west end, of later date than the rest of the church. On the north side of the chancel is a brick vestry, built A.D. 1516, with an apartment over it containing a library for the use of the parish and neighbourhood. In a vault under the chancel Lord Howard of Effingham, afterwards earl of Nottingham, who died in 1539, was buried, with his wife and his two sons, Edward and Armada, and several of his family, are buried. There are meeting-houses for Quakers and Independents. There is a small brick market-house with a town-hall over, and a small building adjacent called the 'clock-house,' used for meetings, and another building for the accommodation of the town. The town-hall occupies the site of an antient chapel of St. Thomas à Becket; and there are some remains of another chapel, said to have been dedicated to St. Lawrence, now converted into a hall. There is an active market on Tuesday for corn and provisions, and a monthly cattle-market. There are three yearly fairs. The Easter sessions for the county are held at Reigate. Reigate is a parliamentary, but not a municipal borough. It returned two members from the 3rd Earl of H, but the number of members was by the Reform Act reduced to one. The previously narrow limits of the borough were extended by the Boundary Act. The number of voters on the register for 1851-3 was 151, for 1859-60, 193. The living is vicarage, of the clear yearly value of £140 17s. 8d. with a glebe-house. It is in the rural deanery of Ewell, in the archdeaconry of Surrey, and the diocese of Winchester.

There were in the parish, in 1833, a free grammar-school, with 279 boys and 144 girls, four other day-schools, with 276 children, namely, 146 boys and 130 girls; and three Sunday-schools, with 171 children, namely, 30 boys and 141 girls.

Eashing is in Godalming hundred, twelve miles south-east of Guildford, and is 7 miles south-east of Guildford. The area of the parish is 3330 acres. There is a tradition of the former greatness of this place before it was ruined by the Danes, but the tradition is unsupported, nor is the place noticed in 'Domesday.' A charter granted by Queen Elizabeth, in the 38th year of her reign, speaks of the antiquity and populous- ness of the town, but refers to its existing impoverishment.
from the extinction of its fair and market; in consequence of which the charter contains a grant for a market and two fairs. The town occupies an elevated site, and is very clean; the streets are irregularly laid out, and neither lighted nor paved. The church, or rather parochial chapel, of which the chancel is the oldest part of the ancient church, is on the north side of the town, and is an ancient structure. The east window has some old painted glass. There is a small square tower at the west end. The Independents have a meeting-house; and the Free Church, which affords a dwelling to some poor persons, but they receive no allowance, owing to the decay of the market, from the tolls of which their stipend was derived. The population of the parish, in 1831, was 849. The market, which is an annual fair, is held on the first Tuesday, and there are two yearly cattle-fairs. There was in 1831 a small manufacture of silk-crepe which employed sixteen men. Haslemere sent members to parliament from time beyond memory, according to the charter of Elizabeth; but it is questioned if any were actually sent until a few years before that charter was granted. They were regularly returned until the disfranchisement of the borough by the Reform Act.

The living is a chapelry, united with the rectory of Chiddingfold; their joint clear yearly value is £224, with a glebe of 5 acres, and £3 10s. 4d. of a glebe-house, with rights of tapestry. The gross annual value of St. Mark's, in the archdeaconry of Surrey, in the diocese of Winchester. There were in the parish, in 1833, a national school, with 60 boys; two other day-schools, with 14 boys and 29 girls; and one master and three mistresses.

Gatton is in Reigate hundred, about two miles north-east of Reigate. The area of the parish is 1,140 acres, partly on the North Downs, partly on their southern foot. Some Roman antiquities have been found, and Gaia contends for there having been a fort. The church tower is built of flint, and there is a sufficient evidence. Aubrey, in his "History of Surrey," has spoken of a castle at Gatton, but without any known evidence from ancient writers or any existing trace of its site. Gatton first sent members to parliament in Henry VI. A. D. 1454, or 1455, or 1456. The franchise was disfranchised by the Reform Act. The place has entirely lost whatever importance it may have possessed, and is now a scattered village of only 23 houses and 145 inhabitants. Gatton, however, has a handsome residence in an extensive and beautiful park: the parish church, which is in the park, is remarkable for the neatness with which it is fitted up. Until the disfranchisement of the borough by the Reform Act, the proprietor of Gatton House was patron.

Chertsey is in Godley hundred, on the bank of the Thames, 20 miles from the General Post-office, London, by Brentford, Twickenham, and Shepperton, and 11 miles west of Kingston through Hampton Court and East Molesey. The area of the civil parish is 2,014 acres, and the name of the town is written by Bede Coetesei, and in the Saxon Chronicle Cortece-ege and indicates the situation of the place, in a peninsula, which was perhaps once an island formed by the Thames, the Fleet, and the River Mole. The Thames was crossed hence by a wooden bridge, and thence by a stone bridge. The town was known in ancient times by its misspelled Benedictine abbey, founded in the times of the Heptarchy. The yearly revenues of the abbey at the dissolution were 744l. 18s. 6d. gross, or 695l. 15s. 6d. clear. The body of Henry VI. was for a time deposited in the abbey. The town is irregularly laid out; the principal street runs east and west, the streets are partially paved and lighted with gas, and the houses are for the most part neatly built of brick. There is scarcely a fragment left of the old town wall, and the town is divided from the river by the Fleet, and the Thames by a line of lighted brick houses, from the north and south which are in a low flat, now forming fertile meadows. The church is in the centre of the town, and is a modern brick building faced with stone, in what is described as the flour Gothic style. The market-house is also more modern, and there is a handsome stone bridge over the Thames, erected in the latter part of the last century. The foundations of an old palace remain, and a building for the Literary and Scientific Society, with theatre, lecture, and reading rooms. The population of the civil parish, in 1831, was 7,475, about three-fourths agricultural; the population of the town is not given separately. The market of wrought and unworked leather, and of all kind of vegetable quantities of leather is raised in the neighbourhood for the supply of London, and a great number of bricks are made. The market is on Wednesday for corn and provisions; it is a considerable market for poultry: there are four yearly fairs. The living is a vicarage, of the clear yearly value of 307l. with a glebe-house, in the rural deanery of Stokie, in the archdeaconry of Surrey, and diocese of Winchester. There are the dissolved schools, endowed, with 268 children, namely, 157 boys and 110 girls; eleven other day-schools of all kinds, with 196 children, namely, 68 boys and 128 girls; two other day-schools, from which there was no return; and two Sunday schools, with about 100 children of both sexes.

Near Chertsey, on St. Anne's Hill, is the residence of Charles James Fox, commanding an extensive prospect. There is a tablet in Chertsey church, erected by his widow, with an inscription.

Dorking is in Wotton hundred, about 24 miles from the General Post-office, London, through Ewell and Epsom. The area of the parish is 10,160 acres. The town is of no historical interest; but is delightfully situated in the valley on the south side of the North Downs, near the river Mole. It is surrounded by gentlemen's residences: Boxworth castle and park on the east, Berry Hill on the south-west, and Churt park on the south-east. The principal street runs north and south; the other streets branch from this. The footpath in the central district leads to the Thames. There is a church, with a steeple, a bridge of stone or chalk. The church is roofed with the coarse flagstones quarried near Horsham: it is cruciform, with the tower, which is low, in the centre; and is principally of perpendicular date. It contains the monuments of Abraham Tucker, lord mayor of London, in the time of Henry VIII.; of the late Lord Godley, in the time of Queen Elizabeth; and of Jeremiah Markland, the classical scholar and critic. There is a town-hall in the middle of the High Street; and there are meeting-houses for Independents and Quakers. The population of the parish, in 1831, was 4,721, about one-third agricultural: the great trade is in flour and lime, and a great quantity of poultry of a peculiar breed, supposed to have been brought over by the Romans, and known by the name of "Dorking." The chief trade is in flour and lime; and there is a mill for the supply of the metropolis. The market, which is well supplied, is on Thursday, and there is one yearly fair. The living is a vicarage, of the clear yearly value of 4l. 15s., in the rural deanery of Stokie, in the archdeaconry of Surrey, and diocese of Winchester. There were in the parish, in 1833, an infant-school with 147 children, 99 boys and 48 girls; two national schools, held also on Sundays, with 138 children, 70 boys and 68 girls; a day and Sunday school for 16 girls; a Dissenting day-school, with 155 children, namely, 55 boys and 100 girls. Dorking is situated on or near the Roman road Stone Street, and it has been said that in digging graves in the churchyard the grave-diggers have occasionally come to the road-waste to find the bricks, which were brought from Virginia Water. Epsom is about 15 miles from the General Post-office, London, on the Worthing road. The area of the parish, which is in Copthorne hundred, is 3,970 acres: the population, in 1831, was 3,231. The town is irregularly laid out, but has a number of good buildings. There is a modern building, and there are two Independent chapels. The market, which had been discontinued, has been lately revived: it is held on Wednesday. There is a considerable trade in flour and lime, and some building materials are carried on, and there are some nursery-grounds. Epsom has mineral springs, now less resorted to than formerly; and in the week preceding Whitsun-week horse-races are held on the adjacent downs, and a great number of spectators. The race-course is a spacious and handsome building. The living of Epsom is a vicarage, of the clear yearly value of £30l., in the rural deanery of Ewell, in the archdeaconry of Surrey, and diocese of Winchester. There were in the parish, in 1833, a national school with 157 children, namely, 108 boys and 57 girls; fifteen other day-schools, with 316 children, namely, 144 boys and 172 girls; and two Sunday schools, with 114 children, namely, 48 boys and 66 girls. The parish of Godalming is in Wotton hundred, about 4 miles south-south-west of Guildford, on the Portsmouth road. The area of the parish is 8,470 acres. The manor of Godalming was bequeathed by Alfred the Great to his...
were defeated and Lord Francis Villiers slain. The town extends about half a mile along the banks of the river, and about a quarter of a mile inland from it. It is irregularly laid out, at the junction of the Hog's Mill river with the Thames: the streets are watched, and lighted with gas, under a local act. The houses are of ordinary appearance. There are houses extending with the town, the church, and a considerable number of houses for different classes of Dissenters. The town is of stone, with five arches; it was erected a few years since, as an expense of 40,000l. in place of the ancient wooden bridge which previously stood here. The chief business of the town is manufac-
ture of silk and clothing; and some silk weaving and woollen manufacture are carried on in the town.

There are some portions of early English architecture, and some curious windows of a later date. In it is a monumental tablet to the memory of the Rev. Owen Manning, the historian of the county, as well as a graveyard in the church-yard, where he was buried. There is a neat modern town-hall, and in the town and neighbour-
hood are some dissenting places of worship.

The parish of the parish, in 1851, was 1,752 acres. Godalming had formerly a flourishing manufacture of kerseys and other woolen cloths, but this is now decayed; the manufacture of silk and worsted stockings, shirts, drawers, flaxen hosiery, and other linen goods is still carried on. Among the rural occupations of the parish, we may notice the growing of corn, the raising of cattle, and the keeping of sheep; there are also some smaller holdings for dairy and market garden produce.

There are no trade unions in the town, but the bridge is a toll bridge. There is a corn mill and a saw mill. There is also a small market every Wednesday and Saturday, and a fair once a year. The town is well supplied with water, and has a good supply of gas. There are two public houses in the town, and a good number of inns and alehouses. There are three Sunday schools, with 500 children, and two infant schools, with 120 children. The town is also supplied with water from the River Wey, which flows through the town. There are two churches in the town, a parish church, and a dissenting chapel. The parish church is a large building, and contains many monuments. There are also some ancient tombs and sarcophagi in the churchyard.

The town is situated on the north-eastern part of the county, and is a market town. It is about four miles from the town of Guildford, and about five miles from the town of Dorking. The parish of the town is about 1,752 acres, and contains the village of Godalming, and the hamlets of Godalming Green, Godalming Bank, and Godalming Cross. The town is well supplied with water, and has a good supply of gas. There are two public houses in the town, and a good number of inns and alehouses. There are three Sunday schools, with 500 children, and two infant schools, with 120 children. The town is also supplied with water from the River Wey, which flows through the town. There are two churches in the town, a parish church, and a dissenting chapel. The parish church is a large building, and contains many monuments. There are also some ancient tombs and sarcophagi in the churchyard.
Domesday,'glebe-house: two four it Bourgeois.

There are several places of worship for Dissenters. There were in 1831 twenty-eight day-schools of all descriptions, with 852 children, namely, 493 boys and 359 girls; and five Sunday-schools, with 750 children, namely, 338 boys and 412 girls. Among the day-schools were the 'Free Charity and Amicable Society Schools,' with 150 boys and 50 girls; but the maintenance of the church, and of the classes supported by subscription, with 51 boys; and a charity-school with 50 girls, 50 of whom were clothed by the institution.

Bromley is on the south bank of the Thames, and lies between Southwark on the west and Rotherhithe on the east. The area of the parish is 220 acres. This parish is included in 'Domesday,' where it is called Bromley: it was a Chancian priory, founded by Aylwin Child, a citizen of London, A.D. 1063: the yearly revenues at the dissolution were £4. 4s. 4d. clear. Bromley now consists of a number of paved streets and roads with flagged footpaths, lined in some few parts with tolerably good houses, but more commonly by others of an inferior description. The old church is a building of little architectural pretension, and of good appearance, and there are some dissenting meeting-houses. The population, in 1831, was 29,741. Near the water-side there are wharfs, and the various trades connected with shipping are carried on; and in that part of the parish which was formerly part of Southwark, and is now incorporated with the metropolis, there is a considerable extent of ground occupied by market-gardens. The London and Greenwich Railroad runs through the parish. The living is a rectory, of the clear yearly value of £140, with a glebe-house: the perpetual curacy of the rectory with the glebe is £100. St. James's Church was built on the site of the old church, and is yearly valued of £300. There were, in 1835, ninety-one day-schools of all kinds, including an infant-school with 60 children, namely, 33 boys and 25 girls; the Bermondsey Free School, with 82 boys and 42 girls; and six schools supported by subscription, namely, the United Charity-School, with 193 boys, 50 of whom were clothed by the institution; another charity-school with 126 girls; a Lancasterian school with 300 boys; two Catholic schools, with 146 boys and 100 girls; and another school with 50 boys and 32 girls. There were also five Sunday-schools.

Rotherhithe and Bromley are, for parliamentary purposes, included in the borough of Southwark.

Newington adjoins the south side of Southwark, and is both by water and land on the other side, by the parish of Camberwell. Newington is in great part incorporated with the metropolis: it includes several important thoroughfares, as one side of Newington Causeway and of the Brighton road, and both sides of Great and Small Stour Street, and many other streets and by-roads of the metropolis. It includes also the village or hamlet of Walworth, on the Camberwell and Norwood road. The streets generally have flagged footpaths, and are lighted with gas. The principal thoroughfares and some other streets have a number of good houses; but the back streets, for the most part, have houses of an inferior description. The old church is a heavy, ugly building; but the new churches, Trinity Church, Trinity Square, and St. Peter's, Walworth, are handsome structures. Newington has no school or meeting-houses. The county-court house, where the winter sessions are held, and one of the county prisons, are at Newington. The population of Newington parish, in 1831, was 44,226. The living is a rectory, of the clear yearly value of £300, with a glebe-house: it is also a vicarage, in the jurisdiction of the archbishop of Canterbury. There were in the parish, in 1831, one hundred and seventy day-schools of all kinds and ten Sunday-schools. Among the day-schools were an infant-school, with 100 children; a Roman Catholic school, with 65 children, namely, 33 boys and 185 girls; a Lancasterian school, with 350 boys; the Walworth Charity-School of Industry, with 180 girls; and the York Street Charity-School, with 70 students.

Camberwell is an extensive parish, extending from the boundaries of Rotherhithe and Bromley on the north to Croydon on the south: its area is 4570 acres: the population, in 1831, was 26,231. The village of Camberwell adjoins Walworth on the south, and consists of four principal thoroughfares meeting in an open green, and leading respectively to London by Walworth, to Deptford by Peckham, to Kennington and to Norwood by Denmark and Herne Hills. These thoroughfares are lined with good houses, especially in the direction of Denmark and Herne Hills, which are lined by a succession of genteel villa residences pleasantly situated. Camberwell old church, an ancient building, was destroyed by fire not long since, and has not yet been rebuilt. There is a new church, St. George's, near the Grand Surrey Canal. A chapel on Denmark Hill is in the parish of Lambeth. The living of Camberwell is a rectory, of the clear yearly value of £500: the perpetual curacy of St. George's, in the gift of the vicar, is of the clear yearly value of £500.

Peckham is a hamlet of Camberwell, which it adjoins on the east: it consists of the main street on the road from Camberwell to Deptford, and of some others. There are a number of good houses, especially those which have been built round a large common called Peckham Rye. One of the new cemeteries for the metropolis is at Nunhead, near Peckham Rye. Peckham is a new episcopal chapel of no architectural pretension, and several dissenting places of worship.

Dulwich lies in a hollow about 2 miles south from the village of Camberwell, and consists of a number of genteel residences, with their numerous outlying villas and cemeteries. Among the churches, there are, the College of God's Gift, which has been much improved in appearance during the last few years; and the episcopal chapel, a plain building, at East Dulwich: behind the college is a picture-galley, containing some fine paintings chiefly by the most celebrated French artists. Also there are, the Union Chapel, of the Bethel, and the Congregational Chapel of the New Body. Norwood is south from Dulwich: it has a number of scattered villa residences; a mineral spring, the Beulah Spa, in a pleasure-ground delightfully laid out; two episcopal chapels, one of the Bethel, and the other a dissenting meeting-house, and a large public cemetery, with episcopal and dissenting chapels for performing the burial service. Norwood is partly in Lambeth, partly in Croydon parish.

Brixton is a hamlet of Lambeth parish, and contains a number of genteel residences, with their numerous outlying villas and cemeteries. There is a new church, St. Matthew's, at the foot of Brixton Hill: an episcopal (formerly dissenting) chapel in North Brixton; and there are several dissenting meeting-houses. On Brixton Hill is a house of correction for the county, and a handsome building for the St. Ann's Society Schools. There are also some almshouses, built and endowed by the late Thomas Bailey, Esq. The perpetual curacy of St. Matthew's is of the clear yearly value of £630.

Kennington adjoins Brixton on the north: it comprehends a tolerably extensive district, on which a handsome new church (St. Mark's) has been erected, and roads leading from this common in various directions: there are a number of good houses round the common and along the main lines of communication; and the western end of the Kennington road is lined by some handsome residences. There was formerly a royal palace at Kennington. There are three proprietary episcopal chapels besides St. Mark's Church: there are also some dissenting chapels.

South of Kennington, on the Capham road, is Stockwell, where is a chapel-of-ease. Both Kennington and Stockwell are in Lambeth parish. The clear yearly value of the perpetual curacy of St. Mark's is £700.

Clapham lies south-west of Stockwell, on the road from London to Epsom, Horsham, and Worthing. It is a considerable town called Clapham. The area of the parish is 1070 acres: the population, in 1831 was 9958. Clapham Common, an open space of about 200 acres, partly in this parish and partly in Battersea, is planted with trees, so as to present the appearance of a park, and is surrounded by handsome houses. There are also a number of handsome houses along the road from London to the common. At one corner of the common is the parish church, a plain brick building. There are two episcopal chapels: St. Paul's and St. James, and another, St. James's, a modern building of Gothic architecture, in what is termed Clapham Park. There are some dissenting places of worship. The living of Clapham is a rectory, of the clear yearly value of £1275, with a glebe-house. The perpetual curacy of St. Paul's and St. James's is £200, and £500, respectively.

Wandsworth is on both sides of the river Wandle at its junction with the Thames. It is about 7 miles from the General Post-office, on the old Portsmouth road. The Lon-
As a helpful assistant, I'm unable to properly interpret the content of the provided image. It appears to be a page from a historical document discussing various locations and their historical significance, but the text is not clearly visible or legible. If you have a clearer image or a transcribed version of the text, I'd be happy to help with any questions or information you might need about the content.
especially boarding-schools. The living is a vicarage, united
with that of Kingston
from Brixton hundred, west of Tooting, be-

between the Portsmouth and Worthing roads. The parish
comprehends 3700 acres; the population, in 1831, was 2195.
Wimbledon park extends northward to the Portsmouth road,
and comprises an area of 2410 acres; it belongs to Earl
Speke. West of the park is Wimbledon Common, nearly
as extensive, on which is an antient circular entrenchment.
The church is a modern building. There are meeting-
houses for Independents and Wesleyan Methodists. Merton
is in the Brixton hundred, and comprises an area of 300 acres; it ad-
joins Wimbledon on the south. The parish has an area of
15-40 acres; the population, in 1831, was 1447. Mitcham
is in Walington hundred, between the Worthing and
Brighton roads; the area of the parish is 2670; this is divided into
four quarters for the regular canons of St. Augustin, the yearly rev-
ues of which at the dissolution were 1039l. 5s. 3d. gross, or
957l. 19s. 4d. clear. Merton has some historical interest; its abbey was the place of meeting of the
assembly which enacted the 'Provisions of Merton.'
[HENRY III.] Part of the outer walls and the east window
of the abbey church are still standing. Merton church has
some Norman and early English portions, mingled with
others. The Merton church has no portion of
perpendicular date. The river Wandle flows through these
three villages, and contributes to manufacturing operations.
There are several establishments for printing calceoes and
silks; and there are considerable copper-works; leather-
dyers, and there are several flour-mills for milling
grain, and two or three malthouses and breweries, and
gardens and fields for aromatic and medical herbs. Mitcham
is a vicarage; Merton and Wimbledon are perpetual cura-
tures; their gross values are 448l., 92l., and 170l.: Mitcham and Merton have glebe-houses; all are in
the rural deanery of Ewell.

Ewell is about 13 miles from the General Post-office, on
the Worthing road. The parish, which is partly in Cop-
thorne hundred, near the foot of Banstead downs. A little
to the east of it, but in Cuddington parish, are the remains
of Nonsuch Palace, built with great magnificence by Henry VIII.
Ewell is carried on an area of 2410 acres; the pop-

ulation has been discontinued, but there are two yearly fairs, one of
them a very large sheep-fair, and considerable trade is car-
ried on. There are a brick, tile, and pottery work, and
several saws and flour-mills. Ewell is a vicarage, united
with the perpetual curacy of Kingwood chapel, of
the clear yearly value of 277l., in the rural deanery of
Ewell.

Along the road that leads by the foot of Banstead downs
down to Croydon are the villages of Cheam, Sutton,
Carshalton, Wallington, and Beddington, all in Walington
hundred. Beddington and Carshalton are on the Wandle, and
had, in 1831, a joint population of 3348. There are
several flour-mills, and there are drug, snuff, ...; and a distillery
of mint and lavender water. Some leather-dressing is also

... carried on. Carshalton church has some early English
and some decorated English portions. Beddington church is
handsome, with a fine tower; it is mostly built of flint and
stone, and is of perpendicular character.

Leatherhead is nearly midway between Epsom and Dork-
ing, on the Worthing road. The parish, which is in Cop-
thorne hundred, had, in 1831, a population of 1758. The
village is in a meliorating state, and tanning is carried on. It had formerly a market, now disused. The
church is antient and cruciform; the chancel is of decorated
character, the north transept perpendicular. There is an
Endowment.

Wimbledon-on-Thames is in Elmbridge hundred, on the south
bank of the Thames, about 4 or 5 miles west of Kingston.
The population in 1831 was 2055. It is near the line of the
London and South-Eastern Railway. It has a number of
basement mansions, and a considerable residence of the late duke of York. There is a church
of considerable antiquity, and an Independent chapel.
South-east from Walton, on the Portsmouth road, is Esher,
which is Claremont House, the residence of the late princess Charlotte of Wales, who died there.

Egham is near the north-western boundary of the county,
P. C. No. 1463.

on the banks of the Thames, on the high road to Salisbury,
21 miles from the General Post-office through Hounslow
and Staines. The principal streets extend for a foot
on the high road, and contains a number of respectable
houses. The parish has an area of 7440 acres: the
population in 1831 was 4203. There are a parish church, a
modem brick building, and a Wesleyan chapel. In the parish,
there near Virginia Water a mile or more from the road,
a church has been erected. Egham has a good local trade.
North of the village, on the bank of the Thames, is Runny-


mead, where King John signed Magna Charta. The living
of Egham is a vicarage, of the clear yearly value of 572l.,
with a glebe-house.

Divisions for Ecclesiastical, Legal, and Parliamentary Purposes.—The county is wholly in the diocese of Win-
chester, in which it constitutes the archdeaconry of Surrey,
the diocese being divided into nine archdeaconries; those at East
Stoke; antiently there were four, Ewell, Southwalk, Guild-
ford, and Croydon; Guildford is now Stoke, and Croydon
has been chiefly united to Ewell. Some other altera-
cions have been made, but they are of little moment. The
number of ecclesiastical curates of all kinds is as follows:

<table>
<thead>
<tr>
<th>Rural Deanery</th>
<th>No. of Curates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ewell</td>
<td>27</td>
</tr>
<tr>
<td>Southwark</td>
<td>15</td>
</tr>
<tr>
<td>Stoke</td>
<td>35</td>
</tr>
</tbody>
</table>

The county is in the Home circuit, except that for criminal
offences the parts of the county nearest to the metropo-

sis in the district of the Central Criminal Court. The
spring assizes for the county are constantly held at Kingston;
the summer assizes alternately at Guildford and Croydon.
The Epiphany quarter-sessions for the county are held at
the sessions-house, Newington; the Spring sessions at Re-
gate; the Midsummer sessions at Guildford; and the Mi-
chealmas sessions at Kingston.

There are courts:
- At Newington (Horsemonger Lane), Brixton, Kingston, Guildford, and Croydon.
- At Mitcham, and Reigate.

The prison in Horsemonger Lane, Newington, is of quadran-
gular form, the air-woods of the criminal division being
enclosed within the building, which consists of three stories
above the basement. Part of the building is appropriated
to debtors. The construction of the prison is defective, ac-
cording to the present system of prison discipline; but it is
solidly built, and in substantial repair. The number of pri-

The management is very imperfect. The prison at Brixton
is a semi-octagonal building, with the chapel in the middle,
in a healthy situation on the rise of Brixton Hill: it is used
exclusively as a house of correction. The construction of
the prison is defective; in the general management, ac-
countability, and order are very creditable. It was in
this prison that the first treadmill was erected. The prison at Kingston
consists of three or four detached buildings badly constructed
and arranged. It is small and insufficient, though the
number of prisoners is not great; so that the discipline
is necessarily very defective. The prisoners are persons
under summary conviction, prisoners intended to be admitted as
witnesses on behalf of the crown, and persons remanded for
re-examination. Guildford prison is on an eminence near
the Wey, within a quarter of a mile of the town: it is solidly
built and good repair, and though of better construction
than was usual at the time it was built, it is defective when
considered in modern light. The prison is large enough to
accommodate 140 prisoners, and has rooms appropriated to
prison discipline. The prison at Croydon is small, having
only four cells and a large day-room: it is used as a lock-up house for prisoners charged with felonies
or manslaughter in Croydon parish, for persons committed
by the court of requests, and for prisoners brought here for
trial when the assizes are held at Croydon. There are,
besides these, three prisons in the borough of Southwark,
the Queen's Bench and the Marshalseas prisons and
the Borough Gaol.

Before the Reform Act, fourteen members were returned to the
House of Commons from the county of Surrey; two
for the county itself, and two each for the boroughs of
Southwark, Guildford, Haslemere, Gatton, Blechingley,
Bleedingley, and Reigate.

Blechingley were altogether disfranchised, and Reigate
was reduced to one member: but the county was formed
Vol. XXIII.—2 T
into two divisions, each returning two members, and the
borough of Lambeth was created, which returns two mem-
bers; so that the present number of members sent from
Surrey is eleven; two for each division of the county, two
each for Southwark, Guildford, and Lambeth, and one for
Reigate.

The two divisions of the county are as follows:—East
Surrey comprehends the hundreds of Brixton, Kingston, Reigate, Tandridge, and Wallington; the court of election is
held in each, and the polling-places are by custom, Rotherhithe, Greenwich, New Town, and Kingston. West Surrey com-
prehends the hundreds of Blackheath, Coptstone, Effingham, Embrydge, Farnham, Godalming, Goly, Woking, and
Wotton; the court of election is held at Guildford; and the
point of distinction is the following:—

The parliamentary constituency in the years 1835-6 and
1839-40 was as follows:—

<table>
<thead>
<tr>
<th>County</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Surrey</td>
<td>5398</td>
</tr>
<tr>
<td>West Surrey</td>
<td>3681</td>
</tr>
<tr>
<td>Southwark</td>
<td>5388</td>
</tr>
<tr>
<td>Lambeth</td>
<td>7104</td>
</tr>
<tr>
<td>Guildford</td>
<td>430</td>
</tr>
<tr>
<td>Reigate</td>
<td>195</td>
</tr>
</tbody>
</table>

The returns for 1839-40 do not include the county of
Surrey, for what reason is not stated.

The boundaries of Southwark, Guildford, and Reigate
were enlarged by the Boundary Act of 1832, and the
important parishes of Rotherhithe, Southwark, and Christchurch, and the Clink liberty in St. Saviour's parish, were added to Southwark: the districts thus added contained, in 1831, a
population of about 60,000. The parts added to Guildford
constituted the parish of Shottermill, which was added to
Guildford and contained a population of about 3400. The
borough of Lambeth comprises the parish of Newington and parts of Camberwell and Lambeth parishes, with a population, in
1831, of nearly 145,000.

History of Surrey.—At the earliest historical period this county seems to have been, for the most part, included in
the territory of the Regni ("Pýyos, as Ptolemy writes the
name), a nation, probably of the Belgic stock, who occupied also the adjacent country of the Eburos. The historian, however, identifies them with the Bibroci of Caesar, which is a more
probable conjecture than Manning's. In his second expedition
Caesar advanced westward from Cantium, or Kent, through
to the Thanes, which he crossed probably at a ford near the town of Wark. Where the river thence was navigable, he
some time passed his camp at or near Kingston. Gale observed
traces of a camp, which he supposed to be an Roman, about
a mile and a half south of the ford at Crowe Stakes. Several
antient enclosures are still existing in the county; on the
Beegly Heath, about 4 miles beyond Egham, there is a
very large one, in form approaching a parallelogram; on St.
George's Hill, between Weybridge and Cobham, is another
of irregular form, following the shape of the hill on which it
stands; and on the southern, or Roman road, near Laindon
Farnham, partly in this county and partly in Hamp-
shire, is another, popularly called "Caesar's Camp," of
irregular form, following the brow of the hill on which it
stands; and in Manning's "Hist. of Surrey," Roman camps
are mentioned in Morden, near Dorking, in the Holmes
Hill, on Hartwood Common, and at Hascombe, near Godalming, as mentioned. There is a piece of ground on
Worms Heath, near Chessilham, between Croydon and Tulse
Y, called "the ground of Fort," by irregular pits and
banks, but no lines can be traced.

Surrey was included in the Roman province of Britannia
Prima. No Antonine station is ascertained to have been set
up there; though Lecestrinum (London) and Pontes (Staines) were
near, and also between the rivers; and Noviomagus, the
Noyospy of Ptolemy, the capital of the Regni, was prob-
ably at Holmwood Hill, close on the eastern border, in Kent.

It is probable that several Roman roads crossed this
county: the most remarkable and best known is that which
ran from Londinium. Its direction does not appear to be
ascertained until it reached Woodcocke park, near Epsom:
but it probably passed through Streatham and Wallington
road, thence St. Saviour's, and by the old road which runs from
downwards to Dorking, and from thence to Bexley, by which it is known as Stonel
and the Old Street. These roads make the road to be a
very remarkable one. From Dorking westward, in the direction of Guildford
and Farnham, into Hampshire.

Another road is supposed to have run into Sussex near
East Grinstead, and is in-supposed to be the road just dis-
described near Croydon; but if the opinion is adopted that
the road described above ran not by Croydon,
but by Ewell, this road must have branched from it much
near London: in which case it probably ran through
Streatham (which appears to have received its name from
being on a street or Roman road), and from thence south
by Oldstone (near which is a place called Stratton, with
the traces of an antient fortification), and so into Sussex. Some
antiques fix Noviomagum at Woodock near Croydon.
It is probable that the Roman road from Londinium to
Callerus and Sorbiadunum (Silchester and Old Barum)
crossed the north-western border beyond Staines. Traces of
Roman buildings have been found in various places, as
at Abury near Guildford, at Grestone near Hampshire
bricks which were incorporated in the castle walls, at or
near Kingston, and on Walton heath, Walton-on-the-Hill,
north-east of Dorking.

It seems most likely that Surrey was, in the earlier
period, a part of the kingdom of Wessex, not, as is commonly supposed, of Sussex. It was included, as it appears, from the earliest period in the West Saxon
diocese of Winchester; and the earliest hostilities which
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On the death of Ethelbert (a.d. 857) his son Ethelwulf succeeded him as king of Wessex, and Athelstan, son of Ethelwulf, as sub-king of Kent. By one or both of these princes the Danes were defeated with great slaughter (a.d. 851) at Aclea or Ockley in Surrey. In 853 the men of Surrey resisted in defeating the Danes in the Isle of Thanet; but lost their K杳lorman, or governor, Huda, or Waad, who was slain in the action. The history of the subsequent period is obscure. On the death of Athelstan it appears that Ethelbert, third son of Ethelwulf, succeeded as sub-king of Kent, but when Ethelbert was deposed from Wessex by his second son Ethelbald, he took the title of king of Kent, with a nominal supremacy over Ethelbert. Whether Ethelbert resigned the government of Kent to his father Ethelwulf, or whether Ethelwulf possessed no more than a nominal power anywhere, is not clear. On the death of Ethelwulf (a.d. 856 or 857) Ethelbert reigned in Kent; and on the death of Ethelbert (a.d. 861) Ethelbald succeeded both to Kent and Wessex, which for several reigns remained under the same king. In all these arrangements Surrey seems to have formed part of the kingdom of Kent.

In the war of Ethelred or Ethelred I., with the Danes, the king and his brother were slain, and Ethelred received a wound, of which he died soon after. In the struggle of Alfred with the Danish chieftain Hasten or Hastings, the Danes were bested by the king's army at Farnham (a.d. 1066), and in the struggle between the Anglo-Saxons and the Danes that we may refer the quodam by Camden:

"The vale of Halmsted!
Never worse, no never shall!"

Holmedale is the valley under the southern side of the North Downs, between them and the green-sand hills.

Some of the Anglo-Saxon kings were consecrated at Kingston; Athelstan, a.d. 925; and Ethelred II., a.d. 979. In a.d. 1042, the Anglo-Danish king Hardicanute, or Hardicanute, died through excessive drinking at Lambeth.

It was a little before this time that Alfred, son of Ethelred II., was seized at Guildford, his eyes put out, and his fol- lows massacred.

After the Conquest, William, Earl Warrenne, a follower and son-in-law of William the Conqueror, received the grant of many lordships in Surrey, and was by William Rufus, soon after his accession (a.d. 1087 or 6), made Earl of Surrey. On the extinction of the male line, in the person of his grandson (a.d. 1148), the earldom passed to William of Blois, son of King Stephen, and to Hamelin Plantagenet, natural brother of Henry II., who successively married the daughter of the Earl of Suffolk and the eldest daughter in the family of the latter, in the male line, it continued till a.d. 1347. From this line the earldom of Surrey passed to the families of Fitzalan (a.d. 1347), Holland (a.d. 1297), Fitzalan again (a.d. 1400), then, after a period in which it was dormant, to the family of the latter, in the male line, it continued till a.d. 1347. From this line the earldom of Surrey passed to the families of Fitzalan, Holland (a.d. 1297), Fitzalan again (a.d. 1400), then, after a period in which it was dormant, to the family of the latter, in the male line, it continued till a.d. 1347.

In the war of Edward the Black Prince, with the French, the English army was commanded by the Marquis of Pembroke.

The town of Guildford, which was captured by the Danes in the time of Ethelbert, was the scene of the battle of Guildford, in which the Danes were defeated by the English army, under the command of the Duke of Normandy.

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<table>
<thead>
<tr>
<th>HUNDREDS,</th>
<th>1801</th>
<th>1811</th>
<th>1831</th>
<th>1841</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackheath</td>
<td>1,790</td>
<td>1,780</td>
<td>2,474</td>
<td>2,128</td>
</tr>
<tr>
<td>Brixton</td>
<td>40,850</td>
<td>57,092</td>
<td>74,064</td>
<td>90,688</td>
</tr>
<tr>
<td>Cophorne</td>
<td>1,505</td>
<td>2,094</td>
<td>4,640</td>
<td>1,508</td>
</tr>
<tr>
<td>Effingham</td>
<td>248</td>
<td>315</td>
<td>775</td>
<td>1,262</td>
</tr>
<tr>
<td>Elmbridge</td>
<td>1,152</td>
<td>1,499</td>
<td>3,118</td>
<td>3,815</td>
</tr>
<tr>
<td>Farnham</td>
<td>1,472</td>
<td>1,634</td>
<td>2,823</td>
<td>2,963</td>
</tr>
<tr>
<td>Godalming</td>
<td>1,834</td>
<td>2,147</td>
<td>3,907</td>
<td>1,953</td>
</tr>
<tr>
<td>Godley</td>
<td>2,998</td>
<td>3,224</td>
<td>3,141</td>
<td>2,047</td>
</tr>
<tr>
<td>Kingston</td>
<td>1,735</td>
<td>1,997</td>
<td>3,347</td>
<td>2,963</td>
</tr>
<tr>
<td>Reigate</td>
<td>1,275</td>
<td>1,485</td>
<td>2,445</td>
<td>1,953</td>
</tr>
<tr>
<td>Tandridge</td>
<td>1,581</td>
<td>1,782</td>
<td>3,052</td>
<td>2,963</td>
</tr>
<tr>
<td>Wallington</td>
<td>13,480</td>
<td>22,335</td>
<td>24,942</td>
<td>14,647</td>
</tr>
<tr>
<td>Woking</td>
<td>2,112</td>
<td>2,490</td>
<td>3,145</td>
<td>1,885</td>
</tr>
<tr>
<td>Wotton</td>
<td>2,485</td>
<td>3,005</td>
<td>3,897</td>
<td>2,963</td>
</tr>
</tbody>
</table>

The population increased 313,570 from 1801 to 1841, being 116 per cent.; the increase for England during the same period being 79 per cent. The details of the census of 1841 are not yet fully published, but the number of inhabited houses was 95,372; uninhabited 39,485; and 1,218 were building.

The population, &c. of each hundred and borough, according to the census of 1831, was as follows:

**On land** | £108,487
---|---
Dwelling-houses | 240,389
Mills, factories, &c. | 27,187
Manorial profits, navigation, &c. | 2,127

Total | £376,151

The amount expended was—

For the relief of the poor | £236,375
In suits of law, removal of paupers, &c. | 8,657
For other purposes | 98,343

Total money expended | £365,443

The county expenditure in 1834, exclusive of that for the relief of the poor, was 25,872l. disbursed as follows:—

Bridges, building, repairs, &c. | £738
Gazols, houses of correction, and maintaining prisoners | 11,663
Shire-hall and courts of justice, building, repairs, &c. | 188
Lunatic asylum | 194
Prosecutions | 3,102
Clerk of the peace | 677
Conveyance of prisoners before trial | 1,154
Vagrants, apprehending and conveying | 110
Coroner | 461
Payment of principal and interest of debt | 5,000
Miscellaneous | 2,400

Total | £25,872

The county-rate levied at different periods, and the principal disbursements, are shown in the following table:

<table>
<thead>
<tr>
<th>Date</th>
<th>Education</th>
<th>1831</th>
<th>1832</th>
<th>1833</th>
</tr>
</thead>
<tbody>
<tr>
<td>1851</td>
<td>Bridges</td>
<td>24</td>
<td>658</td>
<td>999</td>
</tr>
<tr>
<td></td>
<td>Gazols</td>
<td>8,729</td>
<td>991</td>
<td>8,744</td>
</tr>
<tr>
<td></td>
<td>Prisoners'</td>
<td>3,652</td>
<td>1,946</td>
<td>6,430</td>
</tr>
<tr>
<td></td>
<td>Constables and vagrants</td>
<td>211</td>
<td>181</td>
<td>811</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>204</td>
<td>3,158</td>
<td>11,333</td>
</tr>
</tbody>
</table>

Income | £13,702
Expenditure: | £1,116

Income | 21,116
Expenditure: | £21,169

Income | 29,659
Expenditure: | £17,018

Income | 29,659
Expenditure: | £17,018
The length of streets and highways, and the expenditure thereon, were as under in 1839:—

<table>
<thead>
<tr>
<th>Miles</th>
<th>Streets and roads repaired under local acts</th>
<th>Turnpike roads</th>
<th>All other highways</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>298</td>
<td>1,249</td>
<td>3,614</td>
</tr>
</tbody>
</table>

Amount of rates levied:—

- £24,432
- Expended in repairs of highways: £34,925
- Law and other expenses: £293
- Total expenditure: £34,619

The number of turnpike trusts in 1839 was 21; income from tolls, £6,285; from parish compositions, in lieu of statute duty, £154; and the total income was £6,655,427 for the year sane. The amount of the assets, including arrears of income, amounted to £7,3922. In 1836, the debt was equal to 29 years of the annual income; the proportion for England being 43 years; the proportion of unpaid interest to the total debt was 17 per cent., the average for England being 12 per cent.

In 1839 the church-rates amounted to £6,526; and £4,113, applicable to the same objects was derived from other sources. (The amount derived from 'other sources' included 896£, from estates and rent charges. The sum expended for the purposes of the Establishment amounted to £19,772.) In 1839, out of which £6,526, was expended on repairs of churches.

Crime.—The number of persons charged with criminal offences in the septennial periods ending 1819, 1826, 1833, and 1840:—

<table>
<thead>
<tr>
<th>Period</th>
<th>Total</th>
<th>Annual average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1819-25</td>
<td>3,923</td>
<td>404</td>
</tr>
<tr>
<td>1826-32</td>
<td>3,923</td>
<td>404</td>
</tr>
<tr>
<td>1833-39</td>
<td>4,203</td>
<td>420</td>
</tr>
<tr>
<td>1840-45</td>
<td>5,608</td>
<td>560</td>
</tr>
</tbody>
</table>

The numbers committed, convicted, and acquitted in each year from 1834 to 1840 were as under:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Convicted</th>
<th>Acquitted</th>
<th>Committed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1834</td>
<td>3,168</td>
<td>739</td>
<td>2,429</td>
<td>1,900</td>
</tr>
<tr>
<td>1835</td>
<td>3,372</td>
<td>816</td>
<td>2,556</td>
<td>1,816</td>
</tr>
<tr>
<td>1836</td>
<td>3,500</td>
<td>882</td>
<td>2,618</td>
<td>1,810</td>
</tr>
<tr>
<td>1837</td>
<td>3,670</td>
<td>938</td>
<td>2,732</td>
<td>1,932</td>
</tr>
<tr>
<td>1838</td>
<td>3,896</td>
<td>1,103</td>
<td>2,793</td>
<td>2,100</td>
</tr>
<tr>
<td>1839</td>
<td>4,073</td>
<td>1,207</td>
<td>2,866</td>
<td>2,200</td>
</tr>
<tr>
<td>1840</td>
<td>4,258</td>
<td>1,302</td>
<td>2,956</td>
<td>2,300</td>
</tr>
</tbody>
</table>

Of 983 criminal offenders tried at the assizes and sessions in 1840, there were 67 charged with offences against the person; 45 with offences against property committed with violence; 824 (including 412 cases of simple larceny) with offences against property committed without violence; 6 with malicious offences against property; 27 for forgery and uttering base coin, and 19 for various misdemeanours. About eighty-three per cent. of the offenders were charged against property committed without violence; and about fifty-nine per cent. were cases of petty larceny. Sentence of death was not recorded in a single case. Of 722 offenders convicted, 11 were transported for life; 25 for periods varying from 10 to 15 years; 40 from 7 to 10 years; 94 for 7 years—making in all 170 offenders transported; 3 were imprisoned for a term exceeding 12 months; 69 for above 6 months; and 449 for 6 months and under; and 31 were whipped, fined, or discharged on trial. The total number was 2,453 in number; in 4 cases there was no prosecution; in 76 no bill was found; and 185 persons were found not guilty on trial. Of the total number committed, 750 were males and 238 females; 227 males and 93 females could neither read nor write; 288 males and 192 females could read and write imperfectly; 125 males and 12 females could read and write well; 6 had received superior instruction; and the state of instruction of 5 males and 1 female was not ascertained. On an average of several years the proportion of uninstructed criminals in the county was 661 per cent.; those instructed 139 per cent.; the average for England and Wales being 893 per cent.

Savings Banks.—There are 68 of these institutions; and the number of depositors and amount of deposits on the 20th of November in each of the following years was as under:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of depositors</th>
<th>Amount of deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1839</td>
<td>16,928</td>
<td>£3,919</td>
</tr>
<tr>
<td>1840</td>
<td>18,572</td>
<td>£4,572</td>
</tr>
</tbody>
</table>

The deposits of 60 friendly societies, not reckoned above, amounted, in 1840, to £21,027; and 11,376, were invested by 161 charitable institutions.

The state of the elective franchise in 1839-40 is shown in the following table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>E. div.</th>
<th>W. div.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1839</td>
<td>3,613</td>
<td>1,013</td>
<td>2,600</td>
</tr>
</tbody>
</table>


denonminated:—

- Freeholders of every class, 2,073;—
- Copyholders and customary tenants, 976;—
- Leaseholders for life or for a term, 572;—
- Trustees and mortgagees, 40;—
- Qualified by offices, 92;—
- Joint and duplicate qualifications, 43.

Education.—Summary of the Returns made to Parliament in 1833:

<table>
<thead>
<tr>
<th>Description of Schools</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant-schools</td>
<td>114</td>
</tr>
<tr>
<td>Number of children at such schools; ages from 2 to 7 years:</td>
<td></td>
</tr>
<tr>
<td>- Males</td>
<td>1,350</td>
</tr>
<tr>
<td>- Females</td>
<td>1,210</td>
</tr>
<tr>
<td>- Sex not specified</td>
<td>3,584</td>
</tr>
<tr>
<td>Daily-schools</td>
<td>1,093</td>
</tr>
<tr>
<td>Number of children at such schools; ages from 4 to 14 years:</td>
<td></td>
</tr>
<tr>
<td>- Males</td>
<td>2,910</td>
</tr>
<tr>
<td>- Females</td>
<td>1,634</td>
</tr>
<tr>
<td>- Sex not specified</td>
<td>3,324</td>
</tr>
<tr>
<td>Schools</td>
<td>1,207</td>
</tr>
<tr>
<td>Total of children under daily instruction</td>
<td>4,319</td>
</tr>
<tr>
<td>Sunday-schools</td>
<td>244</td>
</tr>
<tr>
<td>Number of children at such schools; ages from 4 to 14 years:</td>
<td></td>
</tr>
<tr>
<td>- Males</td>
<td>9,122</td>
</tr>
<tr>
<td>- Females</td>
<td>10,224</td>
</tr>
<tr>
<td>- Sex not specified</td>
<td>2,400</td>
</tr>
<tr>
<td>Schools</td>
<td>22,536</td>
</tr>
</tbody>
</table>

The amount of endowed schools is £54,741; and a sum of £104,918 is applicable for educational purposes in schools not endowed. (Charity Reports.)

Only two Sunday-schools were returned from places where no other schools existed. Sixty-one schools, attended by 3,335 children, were both Sunday and daily schools. Taking
the numbers returned under daily instruction (45,915), and those attending Sunday-schools (22,536), the total number of children is 68,451, which scarcely exceeds one-half of the total number of children between the ages of 2 and 15. The number of boarding-schools was 182.

SURROGATE is, according to Cowell’s ‘Interpreter,’ ‘one that is substituted or appointed in the room of another, most commonly of a bishop or a bishop’s chancellor.’

The qualifications required in persons appointed as surrogates and ordained and enforced by the canons of 1603, surrogates of inferior courts allowing persons to be variously proceeded against in their courts, respecting the probate of wills which ought to be proved in another court, are to be suspended, and to pay the aggrieved party all expenses incurred through such proceedings. By the 93rd canon, any surrogate of the Praeconate Court vacuously citing any matter into his court on the same day, may have the party so cited his costs, upon pain of suspension. (Gibb., Cod., tit. xxiv., c. 4.) By the 26 Geo. II., c. 33, § 7, every surrogate deputed by any ecclesiastical judge who has power to grant licences of marriage is required, before granting any such licence, to take an oath before such judge and to give a bond of 100l. to the bishop of the diocese for the faithful execution of his office.

Surrogates are also persons appointed to execute the offices of judges in the courts of Vice-Admiralty in the Colonies, in the place of the regular judges of those courts. The acts of such surrogates have, by the 56th Geo. III., c. 92, the same effect and character as the acts of the regular judges.

SURVEYING is the art of determining the form and dimensions of tracts of ground, the plans of towns and single houses, the courses of roads and rivers, with the boundaries of estates, fields, &c. A survey is accompanied by a representation on paper of all the above-mentioned objects, and frequently by a delineation of the slopes of the hills, as the whole would appear if projected on a horizontal plane. When canals or railways are to be executed, a survey of the ground is combined with the operations of levelling, in order to obtain, besides a horizontal plan, the forms of vertical sections of the ground along the proposed lines, and

In maritime surveying, the forms of coasts and harbours, the entrances of rivers, with the positions of islands, rocks, and shoals, are to be determined; also the soundings or depths of water in as many different places as possible.

For trigonometrical surveying, see TRIGONOMETRY.

Since the measurement of the distance between two objects by means of a rod or chain is very laborious and inaccurate when that distance is considerable, particularly if the ground has many equalities of level, and is much intersected by walls, hedges, and streams of water, it will seldom be possible to execute even an ordinary survey by such means alone, and instruments for taking angles must be employed, together with the chain, in every operation of importance.

If within the tract to be surveyed there should be a road about half a mile in extent, and nearly straight and level, so that a line may be accurately measured upon it by the chain, and that from its extremities several remarkable objects, as churches or mills, may be seen, it will be convenient to use such measured line as a base, and with a theodolite to observe the angles contained between the base and the lines joining its extremities to the different objects. The three angles of each triangle formed by such lines should if possible be observed, in order that by the agreement of their sum with 180° the accuracy of the angular measurements may be tested; and then the lengths of the sides of the triangles may be determined by the rules of plane trigonometry.

Let AB represent a base so measured in a road; and let C, D, E, F be four remarkable objects within or near the boundaries of the tract to be surveyed; the distances AC, AD, &c., BD, BC, &c., will be those which should be determined by computation. These lines may then serve as bases, and if from their extremities be taken the angles contained between them and lines supposed to connect them with any other objects, as houses or remarkable trees, the positions and distances of these objects may be determined by computation as before. Thus BC or BD will serve as a base by which the position of G may be computed.

It will obviously be advantageous if lines supposed to
connect the objects lie nearly parallel to the directions of roads, lanes, streams, or hedges, on account of the facility which will allow of the pole works, &c. on the plan. In order that it may be possible to place the theodolite at the angular points of the triangles, those points should not be precisely in the churches, mills, or other objects, will be divided into as many parts, and should be indicated by poles set up near those objects, on spots of ground in such situations that each may be visible from the two others which with it constitute the intended triangle. The place of the building may be ascertained by reference to a sea-coast, with the observation of the point made on land; and it may often be advantageous to determine in like manner the forms of the hedges, walls, &c. in the interior of the tract which is to be surveyed. Ground covered with wood must be surveyed by going quite round it; poles being set up at regular intervals, the distances between them are measured with the chain, and the bearings of the several lines from the meridian are observed with the theodolite.

In order to explain the process of surveying with the theodolite by the method which is commonly called that of the 'back-angle,' and which is now almost constantly adopted, let it be required to determine the outline HKCLBA, which may represent the contour of a wood, or a series of obstacles, &c. (which may even be a road or river. The instrument may be set up at H, which is to be supposed to be the first station; and let the line n be at each of the stations H, K, C, &c. represent the position of the needle or of the magnetic meridian at the station: also let the instrument be supposed to be placed on the side of the horizontal limb may be under the point s (the north point of the needle), or the zero of the degrees in the compass-box may be in coincidence with s; and let K be the second observation. Turn the telescope up to the horizontal plate with the telescope till the object-glass of the latter is directed to K, and make the intersection of the wires appear to coincide with the object at that station: then the index of the vernier will be at some graduation on the lower horizontal plate, as shown in the figure; and if the angle nHK suppos it to be 54°, reckoning from the north towards the west, which angle is usually represented by N. 54° E. [N. B. Previously to directing the object-glass to K, it might have been directed to any other visible objects, as F or D, whose positions it might be required to determine by means of their bearings from the meridian line.]

Let the theodolite be now removed to K, a staff being planted in the ground at H: turn the whole instrument round on its vertical axis (the index of the vernier remaining at the graduation N. 54° E) till the hypotenuse of the telescope is directed to H, and the intersection of the wires appears to coincide with the staff there. Then, if the former angle were correctly taken, and no movement of the instrument has been introduced, the index of the vernier on the needle will lie over the zero of the graduations on the lower plate, or will coincide with the zero of the degrees in the compass-box; and this circumstance will be a proof of the accuracy of the work, all the meridian lines n, m, being supposed to be parallel to one another.

Now turn the upper horizontal plate with the telescope, till the object-glass of the latter is directed to C, and the intersection of the wires appears to coincide with the object at C: the telescope is now moving from the position K to the position KC having passed over and beyond s; and the index of the vernier being supposed to be at y, the number of the graduation, these being read from s in the direction any, will be greater than 180°. Let it be 256 (or 180°+76°); and in that case the observed angle is N. 26° E, and it expresses the bearing of the line KC from the meridian nKS, or from the meridian nKS. If the telescope in moving from KH should be directed to an object at E, then, the index of the vernier being supposed to be at z, the number of the graduation, these being read from s in the direction any, will be less than 180°; let it be 116° (or 180°-64°); in that case the observed angle is N. 76° W, and it expresses the bearing of the line KE from the meridian nKE or nKE.

Let the theodolite be removed to C, a staff being left at K, and turn the whole instrument, the index of the vernier remaining at N. 76° E; till the object-glass of the telescope is directed to K, and the intersection of the wires appears to coincide with the staff there; then the point n of the needle should lie over the zero of the graduations. Now turn the upper horizontal plate till the object-glass of the telescope

offssets from the station-lines nearest to them: the ground

lines of the more considerable edifices, as churches and

mansions, are measured, and the points and lines of

base

rows, the determination of their form, the taking of offsets from the station-lines may become impracticable, and the separate survey of such details must be made by means of the compass, the circumferentor, or the theodolite. [Theo-

dolite.] The same means must be employed for the survey

of a wood, or of a series of objects, &c. (which may even be a road or

river.

The instrument may be set up at H, which is to be

supposed to be the first station; and let the line n be at each

of the stations H, K, C, &c. represent the position of

the needle or of the magnetic meridian at the station: also let

the instrument be supposed to be placed on the side

of the horizontal limb may be under the point s (the north

point of the needle), or the zero of the degrees in the

compass-box may be in coincidence with s; and let

K be the second station. Turn the telescope up to the

horizontal plate with the telescope till the object-glass of the latter is directed to K, and make the intersection of the wires appear to coincide with the object at that station: then the index of the vernier will be at some graduation on the lower horizontal plate, as shown in the figure; and if the angle nHK suppose it to be 54°, reckoning from the north towards the west, which angle is usually represented by N. 54° E. [N. B. Previously to directing the object-glass to K, it might have been directed to any other visible objects, as F or D, whose positions it might be required to determine by means of their bearings from the meridian line.]

Let the theodolite be now removed to K, a staff being planted in the ground at H: turn the whole instrument round on its vertical axis (the index of the vernier remaining at the graduation N. 54° E) till the hypotenuse of the telescope is directed to H, and the intersection of the wires appears to coincide with the staff there. Then, if the former angle were correctly taken, and no movement of the instrument has been introduced, the index of the vernier on the needle will lie over the zero of the graduations on the lower plate, or will coincide with the zero of the degrees in the compass-box; and this circumstance will be a proof of the accuracy of the work, all the meridian lines n, m, being supposed to be parallel to one another.

Now turn the upper horizontal plate with the telescope, till the object-glass of the latter is directed to C, and the intersection of the wires appears to coincide with the object at C: the telescope is now moving from the position K to the position KC having passed over and beyond s; and the index of the vernier being supposed to be at y, the number of the graduation, these being read from s in the direction any, will be greater than 180°. Let it be 256 (or 180°+76°); and in that case the observed angle is N. 26° E, and it expresses the bearing of the line KC from the meridian nKS, or from the meridian nKS. If the telescope in moving from KH should be directed to an object at E, then, the index of the vernier being supposed to be at z, the number of the graduation, these being read from s in the direction any, will be less than 180°; let it be 116° (or 180°-64°); in that case the observed angle is N. 76° W, and it expresses the bearing of the line KE from the meridian nKE or nKE.

Let the theodolite be removed to C, a staff being left at K, and turn the whole instrument, the index of the vernier remaining at N. 76° E; till the object-glass of the telescope is directed to K, and the intersection of the wires appears to coincide with the staff there; then the point n of the needle should lie over the zero of the graduations. Now turn the upper horizontal plate till the object-glass of the telescope
is directed to L, and the intersection of the wires appears to coincide with the object there: then the telescope, in turning from the position CK to CL, passing over and beyond it, a section of the index coincides with the index of the vernier will (reckoning from zero at n) be less than 180; let it be 135°: in that case the observed angle is N. 135° E., or S. 45° E., and it expresses the bearing of the line CL from the meridian nE or sH. If the telescope should be directed to the left, and the index of the vernier nearest to the point under consideration, for example, the number of the graduation, reckoned from n, will be greater than 180; let it be 206, or 180+26°: in that case the observed angle is S. 26° W., or N. 206° E., or N. 144° W., and it expresses the bearing of the line CP from the meridian nH, or sH, in this manner the process of the survey is continued to the end of the road, or till, having passed completely round the wood, the instrument returns to H from whence it set out.

And with regard to local attractions or other causes, the polarity of the needle may not be constant, it is scarcely to be expected that the needle should, when the telescope is directed back to a preceding station, be exactly coincident with the north and south line in the compass-box; yet a near approach to such coincidence will serve to detect the existence of considerable errors in the observed angles; and a complete verification of the whole series of operations will be obtained, should the observed bearing of H from the meridian line nE at the last station A, that is, the angle nAH, be found to coincide with the angle nAH obtained from the on the observed line nH at the first station H. When this agreement takes place the work is said to close accurately.

The survey of a road or an enclosure, by following the courses of the compass-box, or the directions of the angles, may be performed by simply observing with a surveying-compass or a circumferentor the bearings of the several station-lines from the magnetic meridian, and measuring their lengths; and one of these instruments is generally employed when great accuracy is required.

The plane table, which is also occasionally employed for surveying ground, is a square board fitted upon a tripod stand and furnished with a compass, and with an alidade, or ruler carrying 'sights' at the extremities. Drawing-paper is ruled in squares by means of a frame or table, and is set up at any part of the ground which may be thought convenient, a point is marked on the paper to represent the place. The alidade is next turned about that point, so that the line of the sights may be directed to any remarkable objects whose situations are to be determined, and lines are drawn by the edge of the ruler in its several positions; then the distance from the instrument to some one of those objects being measured, and laid down on its line of direction, the intersection of the line so drawn with the line of the sight appearing on the paper is obtained. The table is then removed to that object, and fixed by the needle in the compass-box, so that its edges may be parallel to their former positions; that is, till the alidade placed on the line joining the places of the two objects, an angle in a direction parallel to the place of the instrument. In this position, the alidade being turned about the point which represents the actual place of the instrument on the ground, lines are drawn as before along the edge of the ruler, towards the several objects which had been observed at the preceding station: the intersections of these lines with the others will determine the places of the objects on the paper.

The length of every line which is to be measured must be obtained in a direction parallel to the horizon between its extremities; and the determination of this length is generally a work of considerable difficulty on account of the inequalities of the ground.

Where great precision is required, it would be proper that the length of the line to be measured should be indicated by pickets previously planted at intervals along it; a cord may be stretched tight between the two first pickets, and the measurement be performed by means of a graduated degree line, 20 feet in length, which should be applied successively to the place of the instrument, the extremity of the rod being marked by a pin pressed into the cord. But when the ground is nearly level, a measuring-chain [chain] is laid upon the ground itself in the direction of the line to be measured, and held taut and perpendicular to the ground, the end of each chain's length, an iron-pin, which being taken up by the person who follows, the number of pins so taken up is to show the number of chains in the length of the line. In ascending or descending any gentle elevation of the ground, the chain should be held up at the lower end till it is in a horizontal position, as nearly as the chain-holder can estimate it; and a plummet being suspended from that extremity as to touch the ground vertically under it, the measurement thus obtained is in general sufficiently near the required horizontal length of the line. When the slope of the ground is too great for the present method of measuring, the chain must be carried by a wriggler, who should place it so as to be inclined to the horizon being found by some instrument (a small spirit-level furnished with a graduated arc), the horizontal value of the chain's length must be computed. And if, at the same time, the vertical height of the object to be measured is known, there will be afforded sufficient data for determining on paper the form of a vertical section of the ground in the direction of the measured line.

When the rise or fall of the ground is considerable, the operation will be most conveniently and accurately performed by the use of a theodolite; for this purpose pickets should be set up in the ground, in the direction of the line to be measured, at every place where a change occurs in the inclination of the ground to the horizon, and marks should never be placed any height above the ground equal to that of the telescope belonging to the theodolite; then, while the chainmen are employed in measuring the length of the line on the ground, the surveyor takes the angular elevations or depressions of the points mentioned above, and, by means of the theodolite and theodolite usually carries two series of graduations, from which, by inspection, the angles are determined to the instrument, the portion of the measured line which should be subtracted; if it be found that it reduces it to the length may be found, and also the portion of this horizontal length to which the vertical height or depression is equal.

This method may be conveniently put in practice, but it is required to exhibit sections of the ground, for purposes of guiding the civil engineer in the choice of a line for a road or canal; the great accuracy with which the section might be obtained by a spirit-level and not being requisite, it is now the practice to represent on a plan of the ground a vertical section in the direction of the line of road, for the purpose of showing the depths to which the excavations are to be carried, and the heights to which the embankments are to be raised; a strong line, as a, b, c, d, e, f, g, h, is drawn on the paper, the object of which is to show the profile of the line, as at a, b, c, d, e, are shown the profiles of the requisite excavation; and on the other side, as at b', c', d', e', are shown the profiles of the embankments: both the heights and the depths being determined with relation to the surface of the ground as levelling; the points of foundation to be fixed and levels prefixed upon it.

The principal and secondary station-lines constitute a triangulation on the plan of the ground; and when the lengths of these lines have been ascertained by admeasurement, the superfluities of the whole track may be found by the rules of mensuration. The area of each triangle should be calculated separately from the measured lengths of the lines, and the several results added together, if all the triangles within the given boundaries of the tract should any of them lie on the ground, and the boundary, the areas must of course be subtracted. But as the boundaries of the several fields, &c. seldom coincide exactly with the station-lines, offsets must have been measured from every such line to each remarkable bend in the nearest boundary; and from the station-line, the boundary, and every two of the above mentioned triangles, formed by the measured station-lines, according as it lies within or on the exterior of these separate triangles.
the area of the field or tract is then computed. For this purpose either the plan is divided into two or more triangles, or by a geometrical construction the whole irregular figure is reduced to one triangle of equal magnitude, in which case the lengths of the sides are measured by the scale of the plan.

When a road, river, or any boundary-line is surveyed with the theodolite and chain, the successive operations are registered in a book according to a particular form, by which a person without any knowledge of the ground may be enabled with facility to lay the work down on paper. This is called the ‘Field-Book,’ and the manner of entering in it the series of operations is best explained by means of an example. Let G, Q, R, D, be the principal bends in the direction of a road, and the stations at which, in succession, the theodolite is placed for the purpose of observing the bearings of the several lines G Q, Q R, and R D, from the magnetic meridian passing through the first station G.

At G let the bearing of the object, or mark set up at Q, be observed; let the line G Q be measured with the chain, and let offsets be measured perpendicularly to that line up to any remarkable points near it. At Q let the bearing of a staff at R be observed; also let the length of Q R, and of several offsets from it at remarkable points towards the right and left hand along that part of the road, be measured. Again at R let the bearing of the staff at D be observed; also let the length of R D, and of several offsets along that line, be measured: and let it be supposed that the like process is continued as far as may be required.

Each page of the field-book is then divided, as below, into three columns by two parallel lines drawn down the page: and beginning at the bottom of the column, the several bearings of objects, the lengths of the station-lines, and the several offsets from those lines are inserted, in order, ascending towards the top of the page, the offsets being placed on the right or left hand of the middle column, conformably to their positions with respect to the station-line to which they belong. And it is on this account that the several entries are made in succession from the bottom upwards. The distances in the middle column between the stations Q and R are reckoned from Q; those between Q and R are reckoned from Q, and so on, each number in that column expressing the distance up to the place in the station-line where the offset whose length is given immediately on the right or left hand of the number was taken. When it is required to determine by observed bearings the position of any object, as X, at a distance from the road, those bearings are also inserted in the field-book at the stations, as Q and R, where they were observed, and immediately under the bearing of the next forward station. The mark @ is usually put to signify the word station.'

**Form of the Field-Book.**

<table>
<thead>
<tr>
<th>G</th>
<th>600</th>
<th>A, at D, near the bridge.</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>46</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>46</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>45 to a tree.</td>
</tr>
<tr>
<td>N. 40° 9' E.</td>
<td>S. 31° W.</td>
<td>at @ 3 (R)</td>
</tr>
<tr>
<td>@ 3</td>
<td>500</td>
<td>15</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
<td>15</td>
</tr>
<tr>
<td>42</td>
<td>300</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>To a house</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>25</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>N. 30° 20' W.</td>
<td>S. 82° W.</td>
<td>at @ 2 (Q)</td>
</tr>
<tr>
<td>@ 2</td>
<td>350</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>300</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>32</td>
</tr>
<tr>
<td>To hedge by road. side</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>To a cottage</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>N. 7° E.</td>
<td>at @ 1 (G)</td>
<td>near the bridge.</td>
</tr>
</tbody>
</table>

The term 'plotting' is applied to the process of laying down on paper the plan of the ground which has been surveyed. If the survey has been performed by the chain only, and by the several stations observed, the offsets are applied from the principal bends to the points in any order, and are marked on the paper as a base, from the two extremities of it as centres, with distances of the scale; and the lengths of the sides of the two sides, which with the base form the first triangle, are described to intersect one another; this intersection being joined to the extremities of the base lines, the figure thus constructed of this triangle is then used as a base on which another triangle is constructed with lines taken from the scale equal to the measured lengths of the sides, and so on. After the triangulation is thus formed, the offsets are laid down from them. This part of the process is accomplished by setting out with compasses upon each station-line, from one of its extremities, the several distances (taken from the scale) of the points at which the offsets were measured, drawing lines perpendicularly to the station-line at these points, and from them placing the base and the scale, the offsets lines joining the extremities of these offset lines, either drawn by hand or with a ruler, will represent the lines of roads, the boundaries of fields, and the like. In the construction of the whole, the stations are laid off from the station-lines, the surveyor is usually provided with ivory scales graduated to represent chains and links on the edges; by laying an edge of such scale along the station-line, with the zero of the graduations at one end, the several offsets of the offsets from this extremity can be marked on the line in succession: the scale may then be applied to each offset-line, and the measured extent marked by means of the graduations.

But plotting scales are frequently made with graduations along the edge of the scale as a short scale, also graduated on an edge, which is disposed at right angles to the length of the principal scale, and is capable of being moved to any part of that scale by having one of its extremities cut so as to slide in a groove formed in the direction of the length of the scale. The perpendicular scale is moved along the principal scale to the graduation which denotes the place of the offset, and the length of the latter is then marked by the graduations on the perpendicular scale. Since the offsets frequently extend beyond the limits of one side of the principal scale, the extreme zero of the graduations on the perpendicular scale may be at some distance from the edge of the principal scale, which is then placed, not in coincidence with the station line, but parallel to such a distance that these marks may always be in that line. By this contrivance, which was first proposed by Major Robe, the offsets from the line may be marked, whether they be above or below it, without displacing the principal scale. To find a convenient scale for plotting a survey, the length and breadth of the whole may be computed approximately in order to ascertain the number of chains in such length or breadth, and then the dimensions of the paper in inches being known, the number of chains in each inch may be formed by proportion. Plans of estates are usually made from scales of 2, 3, or 4 chains in an inch, and the linear dimensions, on a plan made from a scale of 3 chains in an inch, are equal to one of the actual dimensions on the ground.

In important surveys, where the process consists in measuring a base and observing with a theodolite the three angles of every triangle, the base is laid down on the paper from some scale as before; and at each of its extremities the angles contained between the base line and visual rays from different objects to that extremity are set by means of a protractor. The intersections of the several lines from the opposite extremities of the base determine the positions of the objects, and form with the base the first triangles. The offsets of these from the base, and the angles observed at the extremities of their sides must be set by the protractor. If any of these lines have been measured by the chain on the ground, the construction of the triangles by means of the angles may be verified by measuring the lengths of

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such lines on the scale by which the base line was laid down. Offsets may also be laid down as already described.

But the practice in ordinary surveys is to observe by the 'back angle,' as before described, the bearings which the different station-lines make with the meridian-line passing through one of the stations, and to measure with the chain the length of each station-line. These bearings and lengths, together with the offsets, are registered in the field books, and they are generally transferred to the paper in the following manner.

A line, as NS, is drawn in any convenient part of the paper, generally in a direction parallel to the right and left sides, to represent the magnetic meridian; and any point Z is set in it, at which the direction of the protractor is placed. Then the bearings, or angles made with the magnetic meridian by the different station-lines, H, K, K C, C L, &c., are set out by the graduations of the protractor about the point so chosen, and lines, as Z 1, Z 2, Z 3, &c., are drawn from this point through the mark made on the paper to set out each angle. These lines are so numbered in order to indicate the particular station at which each angle was observed. Then if the assumed point Z on the meridian line should be the place of the first station, the first line so drawn is in the direction of the first station-line; but if the assumed point is not the first station, the place of this first station must be chosen on the paper, as at H; and a line drawn through it parallel to Z 1 will be the direction of the first station-line. In the same manner by setting out its length from the plotting scale, will be the place of the second station. Through K a line is to be drawn parallel to Z 2, and this will be the direction of the second station-line, whose length K C must then be set out as before. This process is to be continued until all the stations-line have been laid down; when, if the survey has been carried quite round the boundaries of a tract of ground, the second extremity of the last station-line will, provided the operation have been accurately performed, coincide with H, the place of the first station. From these lines the offsets must be set out as before described.

In order to set out the allotments of land in countries which, like some parts of North America, are covered with woods, the surveyor determines on the ground the position of a boundary-line comprehending an area of a square form, each side of which is six or eight miles in length. One of these spaces, which constitutes a township, is usually divided into squares of one mile on each side; and again, these are divided into squares of half or a quarter of a mile on each side.

The boundary-line of the township is determined by measuring with a chain a base-line six or eight miles in length, generally along one side of a road already laid down for some previous township; and at each extremity of this line carrying out one of equal length perpendicularly to the base. A line joining the farthest extremities of the last lines completes the square. In order to mark out the two sides which are perpendicular to the measured base, the circumferentor, or a large surveying-compass, furnished with plain 'sights,' and mounted on a stand, is used. The bearing of the intended line from the magnetic meridian being ascertained from the position of the base, and the instrument being set up at one extremity of that line, the line of the sights is turned so as to make with the needle of the compass an angle equal to that bearing; then the surveyor, looking in the direction of the sights, observes some remarkable trees, and causes the distance from his station to that tree to be measured, small trees, if much there be between himself and the object, being cut down. Notches are cut in the tree in order that it may be distinguished from the others, and the instrument is removed to the opposite side of the tree. The line of the sights is then turned so as to make the given angle with the needle, and the distance of the station to the next remarkable tree in the line is measured as before. This process is continued to the extremity of the line which is to be set out, and stations are placed at the end of each mile, half mile, and quarter mile on the line. From these stations the lines of division and subdivision are carried out in a similar manner.

When the allotments are contiguous to a road, or the bank of a river, a narrow front is measured along the road or river, and the boundary-lines are carried out, perpendicularly to the front, as far as may be requisite in order to comprehend between them the intended area.

SURVIVORSHIP. A question of life contingencies is said to be one of survivorship when a benefit depends upon the order of the deaths of individuals in such manner that it shall be necessary to calculate the chance of one individual dying before another in every year of life. This distinct name depends therefore entirely upon the mathematical character of the problem, and of two questions, which both seem to depend on survivorship in the common sense of the word, one may only do so, in the technical sense, and not the other. Thus, the question of future interest of an assurance on the death of A, provided B die first, is one of survivorship: but that of finding the value of an annuity on the life of A, to begin at the death of B, is not.

The chance of survivorship is that of one individual, now of a given age, surviving another, also now of a given age. The following table exhibits the chance of the older life surviving the younger, according to the Carlisle Table. Thus the chance that 65 shall survive 25 is 0.110; consequently the chance of 25 surviving 65 is 1 - 0.110 = 0.890; and it is 890 to 110, or about 8 to 1, that of two persons aged 65 and 25, the elder shall die first.

<table>
<thead>
<tr>
<th>Elder</th>
<th>Younger</th>
<th>Chance of older surviving younger.</th>
<th>Elder</th>
<th>Younger</th>
<th>Chance of older surviving younger.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>5</td>
<td>0.40</td>
<td>80</td>
<td>50</td>
<td>0.93</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td>0.38</td>
<td>85</td>
<td>55</td>
<td>0.94</td>
</tr>
<tr>
<td>25</td>
<td>15</td>
<td>0.31</td>
<td>90</td>
<td>60</td>
<td>0.88</td>
</tr>
<tr>
<td>30</td>
<td>20</td>
<td>0.29</td>
<td>95</td>
<td>65</td>
<td>0.82</td>
</tr>
<tr>
<td>35</td>
<td>25</td>
<td>0.27</td>
<td>100</td>
<td>70</td>
<td>0.77</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>0.26</td>
<td>105</td>
<td>75</td>
<td>0.72</td>
</tr>
<tr>
<td>45</td>
<td>35</td>
<td>0.26</td>
<td>110</td>
<td>80</td>
<td>0.68</td>
</tr>
<tr>
<td>50</td>
<td>40</td>
<td>0.26</td>
<td>115</td>
<td>85</td>
<td>0.64</td>
</tr>
<tr>
<td>55</td>
<td>45</td>
<td>0.26</td>
<td>120</td>
<td>90</td>
<td>0.60</td>
</tr>
<tr>
<td>60</td>
<td>50</td>
<td>0.26</td>
<td>125</td>
<td>95</td>
<td>0.58</td>
</tr>
<tr>
<td>65</td>
<td>55</td>
<td>0.26</td>
<td>130</td>
<td>100</td>
<td>0.56</td>
</tr>
<tr>
<td>70</td>
<td>60</td>
<td>0.26</td>
<td>135</td>
<td>105</td>
<td>0.54</td>
</tr>
<tr>
<td>75</td>
<td>65</td>
<td>0.26</td>
<td>140</td>
<td>110</td>
<td>0.52</td>
</tr>
<tr>
<td>80</td>
<td>70</td>
<td>0.26</td>
<td>145</td>
<td>115</td>
<td>0.50</td>
</tr>
<tr>
<td>85</td>
<td>75</td>
<td>0.26</td>
<td>150</td>
<td>120</td>
<td>0.48</td>
</tr>
<tr>
<td>90</td>
<td>80</td>
<td>0.26</td>
<td>155</td>
<td>125</td>
<td>0.46</td>
</tr>
<tr>
<td>95</td>
<td>85</td>
<td>0.26</td>
<td>160</td>
<td>130</td>
<td>0.44</td>
</tr>
</tbody>
</table>

SURVIVORSHIP. [Joint Tenancy.] SUS. [Morocco.] SUS. [Susa.] SUSA (Suse), the capital of the country called Susana and Susa by the Greek geographers. It might almost be considered a part of Persis, as Strabo (p. 721, Casab.) observes, for it lay between Persis and Babylonia, and was comprised part of a mountain region, and it extended also to the coast of the Persian Gulf. The length of the sea-coast from the boundary of the sea-coast of Persis to the mouth
of the Tigris was about three thousand stades. The Choaspe
drew through Susiana, from the mountains of the Uti, and
this river is navigable to the s Euphrates, and this circuit
of the coast of Susiana. Between Susiana and Persia there
was a narrow mountain tract, the passes of which were difficult,
and were infested by robbers, who even exacted payment of
the Kerkhah is said to be 31° 30' to the eastward.
According to næræus the whole coast of Susiana was
marshy, and extended westward as far as the mouth of
the Euphrates. Besides the Choaspe, there were the rivers
Coprates and the Pasitigris, which flowed from the moun-
tains, are collected in the rivers of Susiana. Such is the substance of Strabo’s description of Susiana, which is far from being clear.

The modern Khuzistan, which perhaps comprehends
precisely the ancient Susiana, lies between 30° and 38°
N., and there is no doubt that the Meaner was
intended to say that those parallels and meridians accurately
define the limits of the country. From about 31° 30' N. lat.
to 20° the country is flat; north of 31° 30' it begins to be hilly,
and north of 32° the country may be called mountainous.
The first great stream, beginning from the west, is the
Kerkhah (more usually, but perhaps less correctly, written
Kerâh), which enters the united streams of the Tigris and
Euphrates a little below Kurnah, and is identified with the
Chaldaean or Khuzestaile writing, is a tributary of the modern Su. The next stream, to the east, is the
Kuran, or Kacoon, as it is sometimes written, which joins the
Shat-al-Arab by the Hafar cut. This river is formed by two
great branches, of which the Difal, the ancient Coprates, is
the western, and the Kuran, which admits the Shat-al-Arabs
eastern branch. The Difal and Kuran unite about twenty
miles below Shuster, and form the stream anticiantly called
the Pasitigris. The river of Shuster is by some writers
identified with the Eulæus, but others consider the Eulæus
should be the same as the Choaspe. East of the Kuran in the
Jorâh, which likewise flows from the high land, and either
enters the Gulf of Persia or is united by a channel with the
river of Shuster after its junction with the Difal river. The
Kuran, though it is strong, but without any good reason, to be the
Hedyphæus of Pliny.

In proceeding from Difal to Sus, and at the dis-
tance of 10 miles from Difal, the great mound
of Sus is seen. * It forms the north-western extremity of a
large irregular platform of mounds, which appear to have constit-
tuted the fort of the city, while the great tumulus repre-
sents the site of the inner citadel: by a rough calculation
with the sextant I found the height of the lower platform
to be between 50 and 60 feet, and that of the great mound
to be about 300 feet. The mound is circular in outline, and
two measure two miles and a half. The mound which I paced
measured 1100 yards round the base and 850 round the
summit. The slope is very steep; so steep indeed as only to be
ascended by two pathways. Major Rawlinson has placed
a slab with a cone-form inscription of thirty-three lines, three Babylonian
sepulchral urns imbedded in the soil, and in another place
there was exposed to view, a few feet below the surface, a
door of brickwork; * the summit of the mound was thickly strewn with broken pottery, glazed tiles, and kiln-
dried bricks. Beyond the elevated platform extend the
ruins of the city, probably six or seven miles in circum-
ference: they present the same appearance of irregular
mounds, covered with bricks and broken pottery, and here
and there the fragment of a shaft is seen projecting through the
soil. (Major Rawlinson.) There is abundance of fine
grass about the ruins of Sus and the neighbouring country;
and the climate in the middle of March was so mild
that the great mound Difal was distinctly visible, bearing north
36° east. The Kerkhah river is one mile and a half west of the great
mound of Sus. A stream called the Abi-shapar rises about 10 miles north of
Difal, and flows in a deep narrow valley, the so-called
tomb of Daniel, and past the western face of
the great mound: it is said to join the Kuran in the
neighbourhood of Weis, a considerable distance below
the junction of the Difal river and the river of Shuster.
Major Rawlinson estimates the distance of the
channel between the Difal and the Kuran, as
the interval between the Abi-shapar and the Kerkhah. The
Abi-shapar is navigable from Sus to its junction with the
Kuran, and as its bed is deep and narrow, and nearly on
a level with the surface of the plain, it is peculiarly suited
for some kinds of navigation. Thus it appears that Sus is
really on the east side, not of the Kerkhah (Choaspe), but
of a navigable river which flows into the ancient Pasitigris,
and this probably explains the confusion that appears in ancient writers between the
Eulæus and Choaspe. The water of the Abi-shapar
is said to be heavy and wholesome, while that of the
Kuran is said to be salt. Major Rawlinson concludes that
Sus is the site of an ancient city, which is now generally agreed to be the Susa of the Greek
writers, once a residence of the kings of Persia. The
principal arguments in favour of Sus being the site of
Susa are the following: 

(Susiana Survey, notes &c.)

SUSIA, a river of the Sardinian, terminating in the
Italian side of the Alps, which separates it from Savoy on the

(London Geographical Journal, vol. ix., Major Rawlin-
son’s Notes on a March from Zohdb to Khzaitd, &c.)
north, and from France on the west: it is bounded on the south by the province of Pinerolo, and on the east by that of Turin. A great part of the province of Susa lies on the southern slope of the hills, where the name comes from the peaks of Mont Cenis and Mont Genèvre, the highest summits of which are more than 11,000 feet above the sea. The Dora Riparia, which crosses the province in its length from east to west, rises on Mont Genèvre above the village of Cesan- na, and flows in a broad channel through the valley of Susa, passes by the town of Susa, and at Avigliana enters the plain of Turin, and joins the Po north of Turin, after a course of between sixty and seventy miles. The valley of Susa is fertile, and produces corn, wine, flax, hemp, and wine. Its vineyards and meadows present a abundant fruit and vegetables, and afford good summer pasture. The great road from Turin to Savoy and France over Mont Cenis ascends the valley of Susa as far as the town of Susa, and then turning off to the northward, climbs the side of the mountain till it reaches the elevated plain with the small lake or Mont Cenis, famous for its trout, where is the boundary between Piedmont and Savoy. Lower down to the east- ward, in a deep valley or ravine through which the old road formerly passed, is the village of La Novella, with an an- cient and once wealthy monastery, which is often mentioned in the history of the middle ages. In this monastery was found a chronicle, written by the monks, which gave an account of the early marqueses of Susa, and of other baro- nies, and of the events that have since taken place. The name of the chronicle is the Chronicle of La Novella. From the town of Susa, following the ascent of the valley to the westward, is the village of Chiormont or Choumont, known for its wines, which are equal, if not superior, to those of Burgundy. Higher up, on the right bank of the Dora, is built on a rock above the Dora; and still higher is the village of Olix, from which a carriageway leads over Mont Genèvre to Briançon in Dauphiné. From Cessenaa a moun- tain-road leads from the valley of Susa to Clusone, in the province of Pinerolo. Descending the Doro Susa is the village of Bussolino, on the high road to Turin, in the neighborhood of which is a quarry of green marble, commonly called Verde di Susa, and which re- sembles in color that of the ancients called the marble of the town of Avigliana, with 3000 inhabitants, in a very fruitful country, with two small lakes well stocked with fish; and farther down is the town and royal residence of Rivoli, which belongs to the province of Turin. Above Avigliana, and near the town of St. Ambrogio, is the curious village of Chiusea, in a defile, mentioned in history as a strong position of the Longobards in their wars with the Franks, which Charlemagne was obliged to turn, not being able to force it. The church of St. Michele della Chiusa, once the richest in Piedmont, but long since in ruins, and now in a pressed, are on a mountain in the neighborhood. The pop- ulation of the province of Susa is reckoned at 68,600, distributed among sixty communes.

[Valéry, Voyages en Italie; Nouveau Guide du Voya- geur en Italie.]

**SUSA'RON (Zanovil), son of Philleus, was a native of Susa; and his antique village of Triphunum, in the ancient province of Moguntia. He lived about the time of Solon (about Ol. 30), and the Parian Marbles (Ep. 39) call him the inventor of comedy, and seem also to indicate that he gained the prize of comedy
then instituted, which consisted of a basket of figs and a jug of wine. Of what sort of comedy the matter is not quite clear. We know indeed that the Megarians were very fond of farcical entertainments, but it is also certain that the invention of real and written comedies belongs to a later time; and there is indeed, as Bentley's A Dissertation on the History of Comedy (2 vol.) shows, no evidence that the four iambic verses of Susarion still extant formed part of a play. It is further probable that he performed his extempore farces upon a waggon, as was customary at the country Dionysia in Attica. The place where he acted his farces was Leuctra, in Boeotia, whence some writers call him an Iaarian. What is called his invention of comedy must therefore have consisted in introducing into Attica the Doric form of comedy, or he produced some innovation into these farces, and con- structed them on better dramatic principles, which ingenious critics are able to state and explain, inasmuch as no traces of his work have been handed down. But whatever we may think of his improvements, a considerable time passed after his death before dramatic or comic plays were produced, and the Athenians resorted to the comic incidents of their life, or to those of their country, for the purpose of comic amusement, without any regard to the elements of tragic or to the rules of serious poetry. In the laws of the Athenians we read a temporary exemption in one state or other.

Bentley, A Dissertation on the Eup. of Phalaris, p. 144- 152; Müller, Dor. iv. 7, § 2; Hist. of the Lit. of Ant. Greece, i. 490, &c.

**SUSI'NA.' [Susa.]**

**SUSPENSION** is a term used in law when a seigany, rent, or other profit out of land, by reason of the anxiety or necessity of the possession of the seigany, rent, &c., and of the land out of which the profit is derived, is not in the power of the tenant, or may be revoked or awaked. It differs from extinguishment, which is when the rent, &c. is gone for ever by reason of the estate in the land being coextensive with that in the rent, &c.

**SUSPENSION, ECCLESIASTICAL** is a mode of confir- mation, or secondary punishment inflicted by the church on persons guilty of those minor offences which do not deserve the severer penalties of deprivation or excommunication.

In the laws of the church, Bishop Gibson, "we read of two sorts of suspension—one relating solely to the secular, the other extending also to the laity."

"That which relates solely to the clergy is suspension officio et beneficio (i.e. the duties and income of his office) jointly, or in beneficio only, and is called a temporary deprivation or excommunication."

The other, which relates to the laity also, is suspension ab ingressu ecclesiastica (i.e. from entering the church), or from the hearing of divine service and receiving the holy sacrament, which may therefore be called 'excommunication.' He also observes that the two sorts of suspension agree in this, that both are inflicted for crimes of an inferior nature; that both, if practised at least, are temporary; and, lastly, both, if unduly performed, are attended with further penalties." (See Gibb. Cod. tit. 121, cap. 3.)

In the Roman Catholic Church various kinds of suspensions were inflicted for a great variety of offenses. A few may be mentioned to illustrate the nature of this punish- ment. As an example, a priest might be suspended from wearing the sacred vestments of his order, or from exercising any privilege of collating, instituting, or presenting to livings, or from the exercise of his jurisdiction, or from his office and benefice, or even from entering the church. These various species of punishment were inflicted for the purpose of delaying to consecrate a church after proper application, or punishing concubinary priests, or corrupting and irregular prac- tices in instituting persons to ecclesiastical prebendaries. In the infirmary of Piedmont, a private, or other religious persons might be suspended from these offices, benefices, and other services, or from performing service, or from receiving the sacrament, or from entering the church. The offenses so punished were of a different kind, or irregularity in the performance of their duties, not wearing secular clothes, violation of their order with respect to eating and drinking, neglecting to receive the sacrament at Easter, or extortion.

Suspension was either imposed by sentence after trial, in
which case it must have been preceded by admonition, or was ipso facto upon the perpetration of certain crimes. (Gibs., Cod., ut supra.)

Suspension has been retained as a mode of punishment in the English church. By the 33rd canon of 1663, a bishop ordaining a person who has not a proper title, and refusing to maintain him till he prefer him to some ecclesiastical living, is to be suspended from giving orders during one year: by the 35th canon, a bishop admitting to sacred order a person not properly qualified is to be suspended from making either deacons or priests during two years; and by the 36th canon, a bishop ordaining any one who has not subscribed in the manner required by that canon is to be suspended from giving orders during twelve months. It is also declared by the 29th canon, that an abbot or dean, refusing to christen or to bury shall, except under circumstances particularly specified by the canon, be suspended by the bishop of his diocese from his ministry by the space of three months.

Suspension *ipso facto* is also imposed by the 92nd canon upon all ecclesiastical officers who vexatiously cite persons into different courts for the probate of wills.

The above are the principal cases in which suspension still continues to be a convenient form of punishment in the church of England. With respect to the laity, Bishop Gibson observes, that 'although this censure is now disused, as being generally thought no punishment by those that deserve it; yet that it may appear not only from many ancient canons and constitutions in this kingdom, which are still in force; but also from an express Act of Parliament, 5 Edw. VI., c. 4, § 1, which provides, that if any person quarrel, chide, or brawl in or near the church, he shall be liable to the temporary suspension of the place to suspend every person so offending: that is to say, if he be a laity, *ob ingressu ecclesiis*; and if he be a clerk, from the ministration of his office, for so long a time as the said ordinary shall by his discretion think meet and convenient, a form of suspension is to be illustrated.

There are only two other instances in which the legislature of this country has resorted to suspension as a method of punishment. By the 36 Edw. III., c. 8, which however has been repealed by the 21st Jas. I., c. 26, stipulated priors taking, without the bishop's dispensation, more than the salaries specified by the act, were suspended of their office.

The other instance occurs in the act passed at the time of the revolution, prescribing the oaths to be taken to the new government by the I. W. and M., sess. I., c. 8, § 7. Every ecclesiastical person neglecting or refusing to take the oath which declared it unlawful to take arms against the king, and to swear allegiance and fidelity to the King, in the manner directed by the act, was liable to the 1st of the 1st of May to be imprisoned, and after two months, was declared and adjudged to be suspended from the execution of his office by the space of six months. This assumption of the power of ecclesiastical censure by the laity gave them a right to the high church party. (Hallam, Const. Hist., vol. iii.)

**SUSPENSION-BRIDGE,** a bridge in which the weight of the roadway, instead of resting upon arches of masonry, or on a rigid frame-work of wood or iron, is supported by the tension of ropes, chains, or cables.

Though it is only within the last twenty or thirty years that suspension-bridges have been constructed to any considerable extent in this country, such structures are by no means of recent origin. The first bridge of this kind of which we have any account are those of the Chinese; one of which, the iron chain-bridge of Junnan, or Yunnan, is supposed to have been erected about A.D. 65, in the reign of the emperor Mingus. Ware, who mentions this bridge in his 'Tracts on Vaults and Bridges,' and refers to Kircher's 'China Illustrata' and Ogilvie's 'China as his authorities, states that the chord-line is of the length of twenty Chinese pereches, or 200 cubits. The chain and rope-bridges of India are noticed under Bostran, vol. v., p. 167. Those of Japan, which, notwithstanding the extent of the country, have no other name but that of islands, are 'vessels' suspended by vertical lines, and called 'Bridge of the Sea,' 'Voyage to the South Sea, and along the coasts of Chili and Peru' (p. 184 of the English edition of 1717, and p. 166 of the original French edition of 1716), as about 120 fathoms long and six feet wide. The ropes are formed of bark, and the platform consists of cross pieces of wood interwoven with them. Similar bridges have been described by other writers, the platform being in many cases attached immediately to the sustaining ropes, and therefore assuming the same form, which is that of a catenary curve. (Catenary, vol. v., p. 368.) In some cases additional strength is obtained by adding other ropes, suspended a few feet above the level of the platform; vertical ropes being extended between these and the platform, so as to bear part of the weight of the structure. Where the catenary curves of the catenarian force of vertical rods are used, high rocky banks afford facilities for fixing the ends of the ropes; but where this is not the case, they are suspended from an elevated framework of timber, or from trees growing on the banks. If the platform of a suspension-bridge is so constructed as to be capable of being attached to the catenarian ropes or chains, it becomes necessary for passengers to rise to the level of the ends of the catenary, either by a flight of steps or by an inclined road. To avoid this inconvenience, and that of the deflection of the rope-way, the upper set of ropes or chains must be made sufficiently strong to bear the whole weight of the platform, which may then be suspended from them by vertical tiers of various lengths, so as to be nearly or quite horizontal; and the foundation of the bridge must be of wood or stone, resting upon the strength of the framework which supports the ends of the catenaries. Examples of these various forms exist among the suspension-bridges of South America, China, and India, and from them we shall derive the above description for the more perfect structures of recent times is easy and natural.

Rope-bridges have long been used in military operations in Europe. Sir Howard Douglas, in his 'Essay on the Principles and Construction of Military Bridges' (second ed., London, 1832), describes the military suspension-bridge as one that was thrown across the Rhine, at the siege of Potsier, in the time of Charles IX. of France. He refers to Davila's 'Historia de las Guerre Civile de Francia,' vol. i., p. 264, for particulars. Rope-bridges were also used by Henry, prince of Orange, in his campaigns in Italy, in the campaigns of 1742; and on several other occasions. One of the most interesting applications of rope-work in the form of a bridge was made in 1812, at the passage of the Danube by the British army. The object was to provide a passage over Trajan's bridge at Alcanta, one of the arches of which had been destroyed by the French. The gap was near one hundred feet wide, and one hundred and forty feet deep; and over this a net-work of ropes and timber, which had been prepared, was stretched, its extremities being made fast to the remaining masonry of the piers. In connection with this branch of the subject reference may be made to the 'Transactions of the Royal Institute of Cornwall,' vol. x., p. 131, comparing the rope-bridges of Mr. Hume and Mr. Plummer of the British army, which were extended diagonally from the elevated supports or piers to various points of the platform. Temporary suspension-bridges or piers for landing troops, &c. may be supported by ties or poles radiating from vertical masts. Piers or wharfs of this kind are described by Douglas, who mentions one at the Isle of Bourbon, of which an account was given by Mr. C. Noble, in the 'Oriental Repository,' vol. ii., p. 125.

Drewry states that we have no account of the existence of iron suspension-bridges in Europe before the middle of the last century, and that the earliest appears to have been a small one built across the river Tees, at an elevation of about sixty feet, two miles above Middleton, for foot-passengers only. It was called With. Bridge, and was a rope-bridge, similar to those used in the third volume of Hutchinson's 'Antiquities of Durham,' which was published in 1794, and in a paper by Robert Stevenson, in the 'Edinburgh Philosophical Journal;' and in October, 1821. It was, (for whatever it is worth), about seventy feet long, and rather more than two feet wide. Stevenson, in a plate accompanying his paper, represents the roadway as supported immediately by the chains, which are stretched into a nearly straight line, and the ends of the chains are fastened to masts or banks below. A hand-iron is added on one side for the protection of the passengers, whose footing was far from steady. Stevenson was unable to ascertain precisely the date of the erection of this bridge, but he believed it to be.
about 1741. The first iron suspension-bridge built in America was constructed in 1796, by Mr. Finlay, across Jacob's Creek, on the road between Union Town and Greenburgh, the length of which was about seventy feet. Mr. Finlay subsequently, in 1801, obtained a patent for the construction of such bridges and buildings in the United States; or rather, over the Schuykill, was 306 feet long. His specification describes a bridge supported by two chains, which pass over high towers on the banks, and have their ends brought down to the ground, and firmly secured. The central portion of the towers is equal to one-seventh of the span or chord-line. The platform or roadway rests upon transverse beams or joists, two of which, in the centre of the bridge, rest upon the chains at the point of their greatest deflection, while those on either side are supported by vertical suspending chains. Where the vertical chains are attached to one of the horizontal links of the main chains, the connection is effected by simply passing them through the links, and keying them above; but where the vertical chains are attached to one of the vertical links of the main or catenarian chain, it is effected by means of a fork which embraces the vertical link and is keyed above it. In 1807 a scheme was proposed by M. Belu, a French engineer, for crossing the River Seine at Rouen by a chain bridge of 820 feet long, to be supported by a net-work of wrought-iron chains. In 1814 a still more extensive bridge of similar construction was proposed for crossing the Mersey at Run- corn Gap, so as to form a direct communication between London, Liverpool, and Manchester. In his account of the Menai Bridge, states that the plan was sug-gested by Mr. Dumbell, of Warrington, and that, although no design had then been made, an idea had been thrown out of crossing the river by a long chain bridge. The proposition of the scheme was referred to Telford, who, on account of the great width of the stream, the extensive traffic upon it, and the nature of the bottom, coincided in the plan for a suspension-bridge. He therefore made many experiments on the strength and rigidity of chains, considered the proper proportions for such a structure, and prepared a de-sign for a bridge with a central opening of one thousand feet span, and two side openings of five hundred feet each. The deflection of the main chains in the central arch or span was to be fifty feet, and the road itself was to deflect twenty-five feet, so that the longitudinal bars of the roadway, linked together to form chains, might, by their catenarian position, assist in supporting the weight. The main chains were to be suspended in four parallel lines, so as to divide the load of each chain into one hundred and sixteen pieces. The two side spans were to be on two cable-pier ways and a central foot-path. This grand design was sub-sequently abandoned; but it was useful in paving the way for the subsequent adoption of iron suspension-bridges.

A bridge of more importance was erected in Great Britain between the date of this scheme and the construction of the celebrated Menai Bridge. Drewry mentions one across Gala Water, which was made of thin wires, at a cost of only about 40£, although its span was one hundred and eleven feet. It was erected in 1816, by a manufacturer named Lees, of Galabriels. Another wire bridge of about the same length was built in 1817, across the Tweed, at King's Meadows, at an expense of 160£. The platform was four feet wide, and was sustained by wires radiating from the tops of the columns at each end of the bridge. The columns were cast hollow, and within each of them was placed a vertical bar of wrought iron, two inches and a half square, to which the wires were immediately attached. Several bridges were built upon this principle; which, according to Navier, a French writer on suspension-bridges, was suggested many years before by M. Poyet. The most important circumstance in the history of suspension-bridges during this period was, however, the introduction, by Mr. Brown, of the iron chain. Brown, of an improved method of constructing chains for suspending the roadway. Chains of the ordinary form, with short links, are very defective in strength; and several difficulties, among which is the great extent of surface exposed, have been attended with the use of cables consisting of small rods or wires. The plan adopted by Captain Brown was to form chains of round or flat bars of iron, several feet long, having either welded eyes or drilled holes at each end, and bolted together by short link chains. He thus made a model of his invention as early as 1813, and had designed and made calculations for bridges still earlier, but he did not obtain his patent until 1817. His specification gives dimensions for a bridge of a thousand foot span, in which the deflection of the main chains should be equal to one twenty-fifth part of the chord line, while it was proposed to make the platform rise in a gentle curve, so that the road above might be two feet higher than the chord line. He devised an ingenius mode of removing a defective bar, by means of a temporary link, as long as three ordinary links, which may be applied to the chain in such a manner as to bear the weight of the bridge, and consequently to dispense the insinuating links easy and safe. The first extensive bridge erected upon Captain Brown's plan was the Union Bridge, across the Tweed, near Berwick. It was commenced in 1819, and opened for use in July, 1836. The length of the bridge from the chord, or center line, between the tops of the towers, is four hundred and forty-nine feet, and the deflection is about thirty feet. There are twelve suspending chains, arranged in pairs side by side, and in three tiers, one above the other; each chain being formed of round bars and two inches in diameter. With welded eyes, connected together by short coupling- links, the length of which is six inches and three-quarters from centre to centre of the bolt-holes. The bolts for con-necting the rods and links are keyed at one end, and larger at the other; the diameter of the most distant end on the longest and two inches in the shortest diameter. The suspension-rods are round, an inch in diameter, and are attached alternately to each of the three tiers of chains, by being dovetailed into the links of the chains. The distance between the tops of the ends is about one foot seven inches apart; and the joints are so arranged that, although in each chain they are fifteen feet apart, they, and the rods suspended from them, are only five feet apart in each set of three double chains. The transverse wooden joists are supported by a series of longitudinal side-bearers three inches deep and seven-eighths of an inch in thickness, beneath which they are keyed; and upon these longitudinal bearers are laid the transverse wooden joists that immediately sustain the road-way, which is formed of three cast-iron beams, or sus-pension-towers. In the towers the distance between the tiers of chains is increased to two feet; and the length of the links is reduced, in order that the chains may be properly upon rollers mounted to receive them. From these rollers the chains are united obliquely downwards, and their ends are firmly secured in the abutments of the bridge.

In 1821 Captain Brown commenced the Trinity suspension-pier at Newhaven, near Edinburgh, which consists of three spans of two hundred and nine feet each, with fourteen feet deflection. In addition to the catenarian chains and vertical suspension-rods, it has diagonal ties from the piers or towers to points upon the platform; and it has, since the erection of the pier, been deemed advisable to add similar diagonal ties from the piers to the centre of the suspension-towers. In the details of these structures that are near the points of suspension than in the centre of the catenaries, where the strain is less severe. Probably the design above alluded to for crossing the Mersey, and perhaps also that proposed by Telford for a suspended centering for building an iron bridge at the Menai Strait [Scaffolding, vol. xx, p. 499], led to the determination of the Holyhead Road Commissioners, in 1818, to apply to Telford for his opinion respecting the em-placement of an iron suspension-bridge at the Menai. The history of this great work, which more than any other has tended to the extensive adoption of such structures, has been given in detail by Mr. Telford in the last volume of his History of Civil Engineering, where Mr. Telford says: The Menai Bridge, a work of so great magnitude and so novel a character, is given under Bridges, vol. v, p. 413. Telford originally proposed to suspend the platform from sixteen chains, or rather cables, each of which was to consist of thirty-six wrought-iron rods, half an inch square. These small rods were not to be made square, for the purpose of saving metal pieces were to be added, so that the whole might form a round cable nearly four inches in diameter, which should be secured by bucklings, bound round with small iron wire, and coated with some protecting substance. This plan, with several other details of the general plan, was abandoned, and bar-chains resembling those used in the bridges of Captain Brown, excepting in their rectangular section, were adopted. The ordinary link-bars are three inches in length, and three-quarters of an inch in diameter, and their length, with the connecting-plates, is ten feet; but in the subterraneous tunnels in which the ends of the
chains are secured to the rocky shores, the length of the links is reduced to seven feet six inches, and their transverse dimensions are increased to four inches by one inch and a half, so as to diminish the risk of injury by oxidation, which cannot be so readily detected and guarded against as in other parts, owing to the confined situation of the iron-work. 

The connecting-bolts were bored with great care; yet much difficulty was experienced in making them perfectly uniform in distance, since even the small difference in the length of the bars occasioned by changes of temperature being important when they were connected together into chains several hundred feet long. 

To meet this difficulty each chain was provided with a few adjustable joints, at which, by means of wedges inserted in a slot in the bars, the length might be a little increased or diminished. There are sixteen chains, each of which consists of five lines of bars, connected together at the joints by six coupling-plates. The chains are arranged in four vertical tiers, and form four parallel lines of suspension, the distance between which are regulated by the width of the two carriage-ways and the central foot-path. The chains of the first or uppermost tier are connected with those of the third tier by short vertical rods at the joints, from the lower of which the suspension-rods descend; and the second and fourth chains are connected together in the same way, their joints being intermediate between those of the first and third tiers, so that, although the joints of each chain are ten feet apart, the suspension-rods descend at intervals of only five feet. The suspension-rods are an inch square, and they support the other chains since the improvements of Captain Brown and the construction of the Menai Bridge can be here attempted. While the Menai Bridge was in progress Captain Brown constructed the suspension-pier at Brighton, which consists of four openings of two hundred and fifty-five feet, and is the work of 

Mr. Provis, the resident engineer, every piece of iron was carefully tested, and many plans were tried to prevent the injury of the metal by oxidation. That finally adopted was to clean each piece, after proving its strength, then to heat it until the hand could only just be borne upon it, and while hot to immerse it in linseed oil. After remaining in the oil a few minutes, that the pores might be filled, the bar was taken out and returned to the heating-stove, in which it was dried by a moderate heat in three or four hours. The oil was thus converted into a thin coat of hard varnish, which afforded a very complete protection from the atmosphere, although it was very liable to be rubbed off by friction. The whole of the iron-work is protected by painting, which is renewed from time to time, for greater security. 

The massive iron castings which are imbedded in the rock to form an abutment for the chains, are bedded upon two or three thicknesses of coarse flannel, saturated with white lead and oil, which, with a few timber wedges, enables them to bear steadily against the rock. The lower ends of the chains, the last or lowest links of which consist of seven instead of five bars, were put together from the abutments, tackle being used to keep them tight, and thereby to prevent their weight from causing them to slide down the inclined tunnels. The portions of chain between the openings of the tunnels and the tops of the piers or towers were built up upon scaffolding; and, to check undulation, they are tied down by rods to the masonry of the end arches (see the cut above referred to), a very little motion being allowed to them on account of changes of temperature. On the tops of the suspension-towers are massive cast-iron saddles to receive the chains; and between these and the cast-iron beds which sustain them are inserted rollers, which allow the saddles to move a little under their immense load, when the chains expand or contract. The operation of raising the portions of chain between the suspension-towers occasioned much anxiety, but was accomplished without great difficulty by joining together several bars from the top of each tower by a hanging scaffold, and elevating the intervening portion of each chain with a raft four hundred feet long and six feet wide, by means of a capstan. In the Conway Bridge, erected by Telford about the same time, the chains were built up, or put together, upon a temporary rope-bridge stretched between the tops of the towers. 

Before the Menai Bridge was completed, it was found that high winds occasioned considerable vibration, especially in the windward chains. To check this motion transverse braces were applied in such a manner as to tie the several chains together, and to check their individual motion. Each of these, of which there are eight in the length of the bridge, consists of cast-iron tubes placed between the chains, with wrought-iron rods passing through them, which are screwed up at the ends. Thus the stiffness of the tubes prevents the chains from coming too near together, while the tension of the rods serves to check any motion in the opposite direction. The tubes which connect the upper and lower tiers of chains are bound together by diagonal braces. The experience afforded by several great storms has led to the adoption of some alterations in the details of this magnificent work, the most important of which are the suspension of the trussed beams that support the roadway by only two points, instead of three, as originally constructed, and the lowering of the inner of the two suspension-rods, just above the platform. By these alterations more play is allowed, and the risk of fracture to the suspending-rods is greatly diminished.

No enumeration of the suspension-bridges erected in this country and other countries since the improvements of Captain Brown and the construction of the Menai Bridge can be here attempted. While the Menai Bridge was in progress Captain Brown constructed the suspension-pier at Brighton, which consists of four openings of two hundred and fifty-five feet, and is the work of E. A. W. Turner Clark commenced in 1824 the Hammersmith suspension-bridge, the first erected in the vicinity of London. The central opening of the Hammersmith Bridge has a chord-line of four hundred and twenty-two feet, with a deflection of twenty-nine feet six inches; but as the piers are built in the river, and the roadways between them and the shores are suspended from the chains, the total length of roadway supported by the chains is about a hundred and thirty-five feet more than in the Menai Bridge. The width of the bridge is about thirty feet, there being a carriage-way of twenty feet, and two side footpaths of five feet each. There are eight chains, arranged in four double lines, or in two vertical tiers. The chains on each side of the carriage-way consist of six bars each, placed side by side; but on the outermost chains, on the outside of the footpaths, consist of three bars each. The bars are eight feet ten inches long between the centres of the bolt-holes, five inches deep, and one inch thick. The connecting-bolts are two inches and five-eighths in diameter. The suspension-rods are one inch thick, and about five feet apart; and the platform is supported upon double joints of Menai timber, consisting of two pieces twelve inches deep and four inches wide. The lower ends of the rods pass down between the two halves of each joint, and are keyd beneath, upon iron plates of washers. Longitudinal beams are bolted down to the joints on the outside of the footpaths and along each side of the carriage-way, and the platform is stiffened throughout by a strong longitudinal trussing. The ends of the platform, being above the level of the chains, are supported by framework resting upon them, instead of resting upon suspension-rods. This bridge was opened for use in 1827. In 1828 Captain Brown commenced a large suspension-bridge over the South Esk, at Montrose, which is represented in the annexed cut. The chord-line is four hundred and thirty-two feet long, and each chain extends a hundred and fifteen feet.
from the centre of the tower to the farthest end of the chamber of masonry in which its end is secured. There are two chains on each side of the bridge, one above the other, each consisting of four lines of bars, of the same dimensions as those of the Hammersmith bridge. The total width of the road between the suspension-rods is twenty-six feet. This elegant structure was greatly injured in a storm of wind in October, 1838, and has since been considerably strengthened.

Some suspension-bridges have been erected in which the main-chains, instead of passing over a pier or tower at or near each end of the platform, as in the cut given above, are supported by a single tower in the centre of the bridge, and form what may be called two semi-catenaries. The cut here inserted of a bridge constructed in 1823 by Mr. (now Sir M. L.) Brunel, for the Isle of Bourbon, will illustrate this construction, and also explain the means adopted to enable the bridge to sustain the action of violent winds. The upper figure represents the side elevation of the bridge, showing also the mode of securing the ends of the chains; and the lower gives a ground-plan, with the platform removed from one-half, to show the joists. The bridge consists of two openings of a hundred and twenty-two feet each; and, to resist the strain occasioned by hurricanes, which often blow upwards as well as sideways, a set, of chains is added under each half of the bridge, in the form of an inverted catenary; the vertical rods which connect these chains with the platform serving, in ordinary circumstances, to keep the chains in the required form, and, in case of a rush of wind tending to lift the platform, acting as suspension or tension rods to keep it in its proper place. These supplementary chains are not arranged in vertical planes, but in the form shown in the ground-plan, which enables them to offer some resistance to a transverse strain, such as would be produced by a wind blowing at right angles with the side of the bridge.

Similar stay-chains are applied to another bridge, consisting of a single catenary, which was erected by the same engineer at the same time and place; and such have been applied successfully to the Brighton chain-pier and some other suspension-bridges. Another peculiarity in these bridges is the circumstance that the chains do not rest upon saddles or rollers in the suspension-towers, but are suspended by links from a strong framework of cast-iron, by which means very free motion is allowed to the extent necessary to allow for changes of temperature. This mode of fixing the chains was adopted in the Broughton suspension-bridge, over the Irwell, near Manchester, which was erected in 1837.

The above form of suspension-bridge, with a single central tower, has been adopted in the Pont d’Arcole, at Paris, and in a suspension-bridge recently erected over Kenmare Sound, Ireland, of which a description is given in the ‘Civil Engineer and Architect’s Journal,’ vol. i., p. 315.

Mr. Robert Stevenson, in vol. v. of the ‘Edinburgh Philosophical Journal,’ proposed to construct suspension-bridges, under some circumstances, without any elevated points of support for the chains, which were to be firmly secured to the abutments of the bridge, and suspended in a catenary form below the platform, which was to be supported by frame-work built upon, instead of hanging from them. One of the advantages proposed by this arrangement was that the chains might be equally distributed under the weight of the platform, whereas in ordinary suspension bridges they must be so distributed as to leave width between them for carriage-ways. It has been already stated that part of the platform of the Hammersmith bridge is supported above the chains; and Drewry mentions (pp. 95-5) a bridge of one hundred and three feet span on this principle. Some small bridges of wire have been alluded to already, and Drewry describes several of large dimensions which were erected on the Continent soon after the introduction of suspension-bridges upon an extensive scale in Great Britain. The first large one erected in France was that of Touron, across the Rhône, between Tain and Touron, in 1824-5. It consists of two openings of rather more than two hundred and seventy-eight feet each. By far the most important wire-bridge yet built is that over the Sarine, at Frifourg in Switzerland, which was commenced in 1832, and completed in 1834, by M. Challey. It has a span, from pier to pier, of eight hundred and seventy feet, and is one hundred and sixty-seven feet above the level of the river, being much longer and higher than the Menai Bridge. The platform is suspended from four cables, arranged in pairs at the sides of the bridge, with a deflection of fifty-five feet. The wire of which the bridge is composed is about one-twelfth of an inch in diameter, and each cable consists of fifteen bundles of eighty wires each, packed together in a cylindrical form, and bound round at intervals of two or three feet with annealed wire. The wires are not twisted together like

Fig. 2.

Suspension-bridge in the Isle of Bourbon.

Ground-plan of the bridge.
the strands of a rope, but each of them extends straight from end to end of the cable. At the suspension-towers the fifty-six bundles of wire are flattened out into a broad strap, to give them a more extensive bearing upon the friction-rollers over which they are conducted; and after passing these rollers, they are again united into a cylindrical form until they reach the points of attachment to the rock, which are placed at about half the size, each of which is conducted, over a friction-roller, down a vertical pit or well excavated in the rock to the depth of forty-five feet, in the form represented in Fig. 4. The lower end of each small cable is attached to a piece of iron, a, which serves as an anchor; and the bevilled recesses of the excavation are filled up with masonry, as indicated by the dark tint in the cut, so arranged as to resist the enormous strain occasioned by the weight of the bridge. As each main cable has four points of attachment at each end, there are altogether eight of these fastenings at each end of the bridge. The two pairs of cables are suspended at a distance of thirty feet from each other, but the width between the lower ends of the suspension-ropes is only twenty-four feet, so that their position is not quite vertical. These rods are small cables, consisting of thirty wires similar to those of which the cables are composed, and having at their upper end a double hook, which rests upon the two cables, as shown at b, Fig. 5, which represents one of the suspension-rods in two different directions; A being its appearance when viewed in a line with the longitudinal direction of the bridge, and B, its appearance when looking across the roadway at right angles with the main cables. At the lower end of each vertical suspender is a loop, a, which receives the hook of an iron stirrup that embraces the end of one of the transverse beams which support the roadway. There are one hundred and sixty-three pairs of suspending-ropes, at intervals of three hundred feet, to which the roadway is attached. Fig. 6 is a transverse section of the roadway, which is formed of flat planks, supported by the transverse beams, and is stiffened by a strong oak railing, or diagonal truss, running along the sides of the bridge, and by longitudinal beams firmly bolted to the transverse bearers. The bridge was completed at a cost of 24,000L. and was publicly opened on the 19th of October, 1834, on which day upwards of five thousand persons were on it at the same time. A minute description of the work was published in French, from which the particulars of the account in Nos. 279 and 280 of the 'Penny Magazine' are derived. In the former number is given a general view of this remarkable structure, and in the latter are some particulars respecting its construction besides those which are given above.

Fig. 6.

The use of wire instead of bar-chains in the construction of suspension-bridges is favoured by the simplicity of the apparatus necessary for their erection, and the superior strength, bulk for bulk, of small wires over bars of considerable dimensions. The increased surface exposed to oxidation forms a serious drawback, since, with every precaution, it is difficult entirely to prevent it, or to detect its progress; and another difficulty, which is perhaps of greater importance, arises from the impossibility of adjusting the length of each wire to its position in the cable, so that when the cable has assumed its proper curvature, each wire may bear its due proportion of strain. Dredwy considers the latter difficulty so great, that he observes that, if wire must be used, it would be better to form it into links of from ten to fifteen feet long, and to couple these together with short links either of wire or of iron, uniting them by transverse bolts of large diameter, which, for the sake of lightness, may be made hollow. He describes (p. 117) a bridge of this description at Geneva, in which both the long and short links may be called skeins of wire, bound round into a cylindrical form in the centre, and spread out into broad loops at the ends, where they embrace the hollow bolts. The structure is, in fact, a chain-bridge of which the chain-bars and linking-plates consist of bundles of wire, instead of solid bars. He says however (p. 153) that, all things considered, 'it may be safely pronounced that bar-chains are better adapted than wires for anything beyond the size of a foot-bridge.' Many small wire-bridges have been constructed on the radiating system before alluded to, but they are necessarily very subject to vibration, and are consequently unsafe. It is impossible to strain the radiating ties or chains perfectly straight, and yet to leave them sufficiently strong to bear the weight of the bridge; and any inequality in the degree of tension of the different ties may, when the platform is made to vibrate by a load passing over it, or by the action of high winds, occasion strains which no practicable strength will enable them to bear. This plan must therefore be considered inapplicable to any but very small bridges, in which the strength is usually so great in proportion to the strain, as to render defects of construction of but little consequence.

Several suspension-bridges of small span have been constructed upon an ingenious plan which combines the advantages of the opposite principles of tension and compression. The first of these, we believe, was the Monk Bridge, across the river Aire at Leeds, which was erected in 1827, by Mr. George Leather of that place. Fig. 7 represents another bridge, of rather larger dimensions, built by the same engineer, at Hunslet, near Leeds, a few years later. The platform is supported by vertical suspension-rods, the upper ends of which, instead of being attached to catenary chains, are supported by rigid arches of cast-iron, which, rising between the carriage-way and the footpaths, are elevated above the level of the platform. In the bridge here represented the cast-iron arches or ribs are of 192 feet span, and each consists of six pieces fitted together. The suspending-rods are of malleable iron, and they sustain transverse cast-iron beams upon which the roadway is laid. The width of the carriage-way is twenty-four feet, and of the footpaths, which are outside the lines of suspension, seven feet.

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each. Of other bridges on this principle, which combines an unequal number of arches, an increase of the valuable
properties of the ordinary catenarian construction, reference
may be made to that erected for the Birmingham, Bristol,
and Thames Junction (now called the West London) Rail-
way Company, at Wormwood or Wormholt Scrubs, over a
crossing of the Paddington line, by which the railway itself passes by a tunnel under the canal. This
curious bridge, or rather combination of bridges, is described
and represented in the "Companion to the Almanac" for
1840, p. 245. Timber bridges have been constructed on a
similar principle, but in the writer's opinion, the kind of
bridge itself passes by a tunnel under the bridge. The kind of
tress described in the article Rooy, Fig. 18 (vol. xx. p. 148).
Drewry mentions one at Eglisour, near Zürich, in Switzerland, consisting of two arches formed of
15 feet long, 10 inches broad, and 1 foot deep, with their
ends connected by a horizontal brace. The ends of the
arches are tied together by horizontal braces, and the
weights of the platform is suspended by vertical bars arranged
in pairs, which embrace the wooden arch or rib, and are
bolted to it. A similar structure was proposed
some years since for crossing the Thames at Hungerford-
market, where an iron suspension-bridge for foot passengers
is now being erected. Stevenson describes some very
extensive bridges of this kind in his "Sketch of the Civil
Engineers," vol. ii. p. 123. The Delaware bridge, at
Trenton, about thirty miles from Philadelphia, consists of
five arches, varying from 160 to 200 feet span; and another,
over the Susquehanna, at Columbia, is of twenty-nine
arches of 200 feet span.

Most of these bridges have been recently excited by the principle
of constructing suspension-bridges introduced by Mr.
Dredge of Bath, who obtained a patent for his invention in
1836. Without offering any opinion as to the accuracy of
his calculations, it may be briefly stated that he professes
to effect such great economy of material, in the construction
of the rods and chains, that it has been advertised
(Civil Engineer and Architect's Journal, vol. iii. p. 193),
that the Menai bridge might, on the new plan, be recon-
structed at a cost of twelve guineas a foot, whereas it costs
the present structure. The leading features of his plan are
the adoption of every part of the chain to the precise
amount of strain to which it is exposed, by diminishing the
number of plates, and consequently the weight and strength
of the chains, from the points of suspension, to the lowest
or central point of the catenary; and the position of the
suspending-rods, which, instead of being vertical, are ar-
anged in oblique lines from the points of attachment to the
point of suspension in the catenary. The Victoria bridge,
over the Avon at Bath, which was also designed
on this plan in 1836, contains only twenty-one tons of iron,
although it is of 150 feet span. In some experiments
tried at the Adelaide Gallery, London, it was found that a
small number of ordnance, consisting of six ounces and a
half of iron, and forming a piece of five feet eight inches and a half, broke with the weight of
eight persons; while a similar bridge, formed of only six
ounces of iron, on Dredge's plan, bore eleven persons,
until one of them stampeded, when it broke down.

Suspension-bridges are well adapted for many situations
in which, from the limited traffic, the expense of ordinary
stone bridges would prevent their adoption, and also for
places in which, from the great span required, the great
height, the unfavourable nature of the bottom, or the
rapidity of the current to be crossed, the erection of any
other kind of bridge would be difficult, but they are not
applicable to situations of great and constant traffic, since
they are more subject to arches than arch bridges, and very
liable to injury from the vibration occasioned by the
weight of the rural or constructional forces. It is true that, as urged by some of
the advocates of this elegant kind of bridge, the low posi-
tion of the centre of gravity with relation to the points of
support, renders it subject to the influence of a slight
change in the position of the chain, either by its flexible
structure, enables a suspension-bridge to return to its posi-
tion of equilibrium after it has been disturbed by any acci-
dental cause; but this circumstance will not always be
applicable, since its general tendency to disturbance,
and the risk of accidental failure, depend very greatly upon
the stability of the catenary, or very nearly so, in order that the
force upon the suspension-towers may be vertical, and
cannot have any tendency to pull them over in either
direction. Dugdale observes that there is a slight error on
this point in the Menai bridge; the angles formed by the
attention than was formerly deemed necessary to means for
checking the effect of wind or vibration. Dredge (in the
Magazine p. 27) that in small bridges, the mass of materials
suspended is usually too small to do much injury if put
in motion, says that "in suspension-bridges of large dimensions,
and consequently of great weight, the force that the sus-
pension-bridge causes in motion increases
rapidly." Hence, he proceeds, 'It is an object to make the
bridge resist motion, and especially to make every part bear its
fair share of strain. It is a common doctrine that lightness
is the peculiar excellence of a suspension-bridge; but that
principle is of little or no value, if the bridge is not designed
and not taken generally; for a bridge may be, from its
size, just so heavy that by being put in motion it will ac-
quire great momentum, and just so light and slight that it
will be unable to resist the effects of its own vibration.

The effect of the weight of a suspension-bridge is therefore,
that it becomes necessary to make the bridge so heavy to
cause a vibration that would be dangerous, it is advis-
ably boldly to increase their weight, rather than to
attempt to diminish it, and to bind and connect the several
chains, and the roadway firmly together, in order that there
may be sufficient mass and gravity in the bridge to resist
motion, rather than to yield to it readily." Reversed cate-
naries, as in the Isle of Bouron bridges, and lateral guys
extending from the platform to fixed points on the shores,
and one on the Menai bridge being put in motion, are the
most important measures adopted for this purpose is
that of trussing the platform longitudinally by two or more
lines of stiff diagonal trusses, which may be made in the
form of a handsome railing. This is particularly insisted
on in the "History of the Bridge," by Colonel Pasley, of
the Royal Engineers, published in the third volume of the
Transactions of the Institution of Civil Engineers." Upon
the state of the Montrose suspension-bridge, after its injury
by the hurricane of October 11th, 1838. He considers
the connexion of the roadway with the台上s, so that
wind arise chiefly from its action on the bridge;
and, in illustration of his position, observes that in
the storm of November, 1836, the roadway of the Brighton
suspension-bridge was torn up by the wind, and the main-pier
were shattered and blown away. He also refers to
the Hammersmith bridge, which is trussed throughout, as an
illustration of the advantage of the system. It is urged
in this paper, that if the platform, which presents a large
surface to the wind acting from below, be kept undistur-
basing, 'it can scarcely be supposed that the utmost force of
the wind could move the chains at all, having comparatively
so very little surface to oppose to it, and which must be
held down by the great weight of the roadway, so long as
the deck remains in the same state. It is to the writer as to the importance of stiffening the platform,
although he conceives the mischievous action of the wind
may take place laterly as well as vertically; but, in the
Menai bridge, in making repairs after the storm of January 7th, 1838, the platform may the time of
be stiffened by a truss. The suspension-bridge has been, since the injuries
described by Colonel Pasley, strengthened with a system of
longitudinal trusses by Mr. Rendel, who read a description of
it before the British Association in 1841.

Of the theoretical points involved in the construction of
suspension-bridges little will be said. These have been con-
sidered at length by Davies Gilbert, Esq., in a paper read
before the Royal Society in 1836, and printed in vol. cvi.
of the 'Philosophical Transactions,' and in Dury's work,
referred to at the end of this article. The amount of
defection of the chains between the points of suspension must
depend upon circumstances; but Dury conceives that it
ought not exceed ten per cent, or rather less than one-fifteenth of the chord-line, and that one-fourth or
one-thirtieth is a better proportion. Some bridges have
a still deeper deflection; and others, for bearing very little
weight, but as little as one-twentieth; but this Dury
considers unnecessary, because it is impossible to
both the chains by drawing them into so flat a curve detracts
materially from their effective strength. The angle formed
by the descent of the chains upon the land-side of the
shores should be either equal to, or the supplement of,
the inclination of the catenary, or very nearly so, in order that the
force upon the suspension-towers may be vertical, and
cannot have any tendency to pull them over in either
direction. Dugdale observes that there is a slight error on
this point in the Menai bridge; the angles formed by the
chains with an horizontal line being, on the outward and inward sides of the pillar, 18° 10' and 18° 5' respectively. 'From this impropriety,' he says, 'a horizontal force arises, tending to draw the pillars outward; and though this force be very small compared with the pressure on the pillar, yet acting constantly at the end of a lever of such length as the height of the pillar (nearly 200 feet), it may produce injurious effects.' 'This therefore,' he proceeds, 'is an error in principle, which should have been avoided, and which ought not to exist in any such constructions' (p. 349). This error appears to be a very common one, and is in some cases considerable in extent; but the most common error arising from the chains deflects too suddenly on the land-side of the pier, so that the strain tends to throw them into the water.

The method of securing the chains to the abutments is of the greatest importance. Where the abutments are of rock, excavations may be readily formed of a suitable shape, and the required security is easily attainable; but when the abutments are of masonry, Douglas recommends that the whole should be so cramped together that the strain may be borne by the whole mass, and not merely by the wedge-shaped portion upon which it more immediately acts. In all cases the lower part of the chains, and the fastenings by which they are secured, should be left accessible for examination. We may here allude to a singular blunder committed and exemplified by Mr. Telford, in the construction of the suspension-bridge at Manchester, which appears to have been the principal predisposing cause of its fall, although the unusual strain to which it was exposed at the time was the immediate cause of the accident. This bridge, of a hundred yards of the truss, was completed in 1822; the ropes were in a state of unbroken tension, and sustained the strain without apparent injury until 1831, when it broke under the passage of a body of soldiers, about sixty in number, marching over in fours. Two similar parties had passed just before, but as they were not marching in step, their passage produced no injurious vibrations. The roadway was suspended by two double chains, formed of round iron bars two inches in diameter, connected together at the joints by three short elliptical links with cross-bolts, as at a, Fig. 8. The last joint however, by which the chain was connected with cast-iron discs imbedded in the masonry of the piers, consisted of a single link, e, equal in substance to the three small links at a; the cross-bolt, d, of this joint being only the same size as those marked b and c. Thus while the bolts b and c, being exposed to strain near their ends, were far too small for the work, that which had been expected to give way by being shorn asunder, that at d, having no counterbalancing strain at the ends, might easily be bent and broken. Although but one of the bolts was actually broken, they were all found more or less bent. The evil was aggravated by the circular form of the rods, which, as indicated by the dotted lines in the cut, increased the leverage of the strain. This accident, the particulars of which are narrated in the fifth volume of the Memoirs of the Literary and Philosophical Society of Manchester, shows how dangerous it is for a body of men to walk in regular step upon a suspension-bridge; for, with all its defects of construction, the Broughton bridge had sustained far greater weights when applied in a less injurious manner.

Telford and Captain Brown, to determine the strength which may be safely allowed per square inch for the bars of an iron suspension-bridge. The mean of the results obtained by these engineers is about twenty-seven tons to the square inch, which is commonly taken as the standard for the ultimated or breaking strength of cohesion of good malleable iron. It will stretch with much less, and nine tons per square inch is considered as the maximum strain which it is advisable to allow permanently upon the chains of a suspension bridge, although it is certain that the iron bars, which are the most safe, may safely be applied for a short time. In 1827-8 a suspension-bridge of steel was erected over the Danube at Vienna, by an engineer named Von Mitis, whose preliminary experi-ments upon various kinds of steel are recorded by Drewry (p. 20). Von Mitis advocates the use of steel in lieu of iron for such structures, but his experiments were not satisfactory, and the cost were not a prohibition to its use in this country, its advantages may be questioned, since the greater lightness of a steel suspension-bridge in proportion to its strength would render it more liable to vibration than those of iron. The bridges alluded to at Vienna has a third-line of three hundred and thirty-four English feet, with a deflection of nearly twenty-one feet and a half, and its vibration is said to be considerable. In a paper read before the Institution of Civil Engineers, on April 14, 1840, by Mr. Andrew Burn, upon the suspension-bridge over the River Thames at Portsmouth, the use of cast-iron instead of wrought-iron as a material for the chains is suggested; the advantages proposed being economy and diminished risk of oxidation. Suspension-bridges have been built with wooden chains, formed of long bars laid together. Ware mentions several such bridges on the continent of Europe; and Drewry (p. 154, &c) describes some plans for the erection of such structures.

Engineers differ in opinion as to the best arrangement of the material of the main-chains; some using several small chains, arranged in four lines, and in two, three, or four tiers, while others think it better to concentrate the whole strength in two chains only. The latter principle is advo-cated by Mr. Telford in the Manchester bridge, with the object of providing for the unequal expansion and contraction of the different chains. When only two lines of chains are used, it is advisable to have them between the carriageway and the footpaths, which may safely rest upon the projecting ends of the chains. To prevent the gradual weakening of the piers or towers, it is usual to pierce them with arches for the carriageway only; and in some bridges the inconvenience of making the foot-passengers turn into the carriageway in passing under them is avoided by support-ing the foot-paths or foot-passengers by intermediate disks.

(Drewry's Memoir on Suspension-Bridges, 1832; Douglass's (Sir Howard) Essay on the Principles and Construction of Military Bridges, second edit., 1832; Ware's Tracts on Vaults and Bridges, published anonymously, 1832; Edinb. Philosophical Journal, 30, 31, &c, containing an account of the erection of the bridge at Manchester; Section V of the Institution of Civil Engineers, xx. 1838, pp. 279 and 280; Companion to the Almanac for 1833, p. 222; Memoirs of the Litt. and Phil. Soc. of Manchester, second series, vol. iv., pp. 384 and 454; Transactions of the Institution of Civil Engineers, vol. v., p. 219; &c.)

SU'SHEEWA [Pennsylvania]

SU'SRUTA, one of the earliest and most celebrated of the Hindu writers on medicine, was the son of Visvamitra, and the pupil of Dhanwantri. Nothing is known of the circumstances of his birth. He is said to have pursued his medical work still extant, and has been lately published in two vols. 8vo., Calcutta, 1835. It is unquestionably of some antiquity, but it is not easy to form any conjecture as to its real date, except that it cannot have the prodigious magnificence of style which is then traced in thepposites of the age, which shows that it is perhaps the oldest work on the subject which the Hindus possess, excepting that of Charaka. The only direct testimony that we have with respect to the dates of Charaka and of Susruta is that of Professor Wilson, who states that, from their being mentioned in the Prakrit, the ninth or tenth century is the modern limit of our con-jecture; while the style of the authors, as well as their having become the heroes of fable, indicate a long anterior period of composition. One conjecture, however, is entertained by Ubhatta, a Cashmirian, that it is as early as the twelfth or thirteenth century, and his opinion, it is believed, was preceded by others. The work is divided into six portions: the Sutra Sthana, or Chirurgical Definitions; the Nidana Sthana, or Symptoms; the Ashtanga Sthana, or Sutras; the Varga Sthana, Anatomy; Chikitsa Sthana, the internal adminis-tration of Medicines; Kulpa Sthana, Antidotes; Uttar Sthana, or a supplementary section on various local dis-eases, or affections of the eye, ear, &c. In all these divisions both general surgery and specific treatment are treated of. The object of the book of Susruta; though, by an arrangement not un-common with our own writers, he introduces occasionally the treatment of general diseases, and the management of women and children, in such a manner that they do not destroy or impair the bear relation. As this is the only Sanscrit medical work which (as far as the writer is aware) has been pub-lished, it will not be out of place here to give a sketch of the state of medicine among the Hindus, exist-
two notices by Professor Wilson, published originally in the 'Oriental Magazine' (Calcutta, February and March, 1823), from which we quote. Professor Wilson, in his 'Essay on the Antiquity of Hindoo Medicine,' 8vo, London, 1837. The instrumental part of medical treatment was, according to the best authorities, of eight kinds—

**Chedana**, cutting or incision; *Bhedana*, division or excision; **Lehatana**, scraping the end of a tumour. All these operations may be applied to scarification and inoculation; *Vayadana*, puncturing; *Eshyam*, probing or sounding; *Aharya*, extraction of solid bodies; *Pisarana*, extraction of fluids, including venesection; *Sasraya*, the art of sewing. In all these operations, by which these operations were performed seem to have been sufficiently numerous: of these, the principal are the following—Yantras, proper machines, in the present case instruments; but to distinguish them from the next class, those which are more particularly applied, we may call them *implements*; Sattaras, weapons or instruments; *Khaya*, alkaline solutions or caustics; *Agni*, fire, the actual cautery; *Sadaqa*, pins or tents; *Srinda*, horns, the horns of animals open at the extremities, and, as well as alabas, or gours, used as our cupping-glasses; the removal of the atmospheric pressure through the first being effected by suction, and in the second by rarifying the air by the application of a lamp. The next subsidiary means are *Jalaka*, or lees.

Besides these, we have thread, leaves, bandages, pledgets, heated metallic plates for erosurces, and a variety of astrangent or emollient applications.

The descriptions of the very numerous Hindu instruments not only instruct but protect. Professor Wilson says, 'we can only conjecture what they may have been, from a consideration of the purport of their names, and the objects to which they were applied, in conjunction with the imperfect description given.'

With a view to cutting instruments, were of metal, and should be always bright, handsome, polished, and sharp, sufficiently so, indeed, to divide a hair longitudinally.

The means by which the young practitioner is to obtain devotion to this instrument is a mixed character; and whilst some are striking specimens of theSame contrivances to which the want of the only effective vehicle of instruction, human dissection, compelled the Hindus to have recourse, others surprise us by their supposed incompatibility with what we have been hitherto disposed to consider as insurmountable prejudices. Thus the different kinds of section, longitudinal, transverse, inverted, and circular, are directed to be practised on flowers, bulbs, and gourds. Incision, on skins or bladders filled with paste and milk; bleeding, on the fresh hides of animals; the hairs from which the hair has not been removed; puncturing or lancing, on the hollow stalks of plants, or the vessels of dead animals; extraction, on the cavities of the same, or fruits with large seeds, as the Jack, the Betel, sultanas, on skin and less on ligatures and bandages; on well-marked models of the human limbs. The employment of leather, skin, and even of dead carcasses, thus enjoined, proves an exemption from notions of impurity we were little to expect, when adverting to their actual use, or from which their use implies the absence of any objections to the similar employment of human subjects; and although they are not specified, they may possibly be implicated in the general direction which the author of the 'Susruta' gives, that the teacher shall seek to perfect his pupil by the application of all expedients which he may think calculated to effect his proficiency.

Of the supplementary articles of Hindu surgery, the first, *Kasthaka*, alkaline or alkalescent saps, is obtained by burning different vegetables, and boiling the ashes with five or six times their measure of water. In some cases the concentrated solution is used after straining, and is administered internally, as well as applied externally.

Care is enjoined in their use, and emollient applications are to be applied, if the caustic occasions very great pain. At the same time these and the other substitutes for instrumental agents are only to be laid recourse to where it appears that the wound is not of the temporary quality of the patient. They are especially found serviceable where the surgeon has to deal with princes and persons of rank, old men, women, and children, and individuals of a timid and effeminate character.

**The cautery** is applied by hot seeds, combustible substances inflamed, boiling fluids of a gelatinous or mucous consistence, and heated metallic bars, plates, and probes.

The application is useful in many cases, as to the temples and forehead, for headaches; to the eyelids, for diseases of the eyes; to the part affected, for inductions in the skin; to the sides, for spleen and liver; and to the abdomen, for the expulsion of wind and gas. However, the chief use of the cautery was in the case of boils, bleedings being stopped by searing the wounded vessels.

If leeches, when applied, are slow and sluggish, a little blood may be drawn from the part by a lancet, to excite the animal. The same is done with their virtual medicinal marks, which are filled, maintained by the use of the horns and gours, or the substitutes already mentioned for the cupping-glasses of our own practice.

The operations are rude, and very imperfectly described. There are evidently bold, and must have been hazardous: their being attempted at all is however most extraordinary, unless their obstruction from the knowledge, not to say the practice, of later times be considered as a still more remarkable circumstance. It would be an inquiry of some interest, to trace the period and causes of the disappearance of surgery from amongst the Hindus—it is evidently of comparatively modern occurrence, as operative and instrumental practice forms so principal a part of those writings with which the country has been most ably most—but may be, as regarded the composition of inspired writers, to be regarded the highest authority.

Besides those sacred writings, there are many valuable professional tracts which correspond with, and are, in fact, commented upon. The author is said to have been composed by prophets and holy men (Maha Rishis), to whom is generally given a divine origin.

The different nations of India have their respective medical authors. The peninsula of the south of India, in Tamul; those of the Telugus in the south, and the northern provinces, the works in use among the Hindus are in Sanscrit; while among the Mohammedan population Persian works and translations from the Arabic are chiefly used.

The work of Susruta may now easily be procured, as it was one of those ordered to be printed by the Indian government for the use of its native subjects; but the printing of this, as well as of many others, was stopped, when most of them were nearly completed—the first volume and three-fourths of the second of the Susruta having been printed. Fortunately the Asiatic Society of Calcutta, with the spirit and zeal which has ever distinguished it, and with a true knowledge of what was for the benefit of the government itself, undertook the work, and have an edition so admirably most—published by the same body. It is generally considered the highest authority.

**Sussex** is a marit ime county in England, due south of Greenwich, the meridian of which passes very nearly through the centre of the country. It lies between 50° 43' and 50° 52' N., and 0° 4' and 0° 26' W. It is 118 miles long, and 27 miles wide. Its area is 1466 square miles, or 938,240 acres. The gross population in 1841 was 299,770, being an increase of 10 per cent. on the census of 1831, and giving 204 inhabitants to every square mile. In size it is the 14th of the English counties, in population the 18th, and in density of population the 4th of all the counties. The north-eastern and north-western quarters of the county are 30 miles from London, nearly in a direct line south, or 49 miles by the road through East Grinstead, Fletching, and Chailey, or 31 miles by the mail-road through East Grinstead and Uckfield.

**Surface;** Coast; Rivers. — The principal feature in the surface of Sussex is occasioned by the intervention of the high ridges of chalk hills generally known as the Downs. These hills rise from the marsh of Pevensey to the bold promontory of Beachy Head. The tract of land, as far as Shoreham, occupying a surface of about 26 miles in length, and six or seven in breadth, containing 99,840 acres. This tract is properly denominated the South Downs. From Shoreham the Downs gradually recede from the coast and traverse the western part of the county, bearing
...some points towards the north, and enter Hampshire between West Harting and Stanstead near Petersfield. Their extent continues, and is bounded on the south by the line of the coast and the Hants and Isle of Wight boundary, which is protected by a small round tower, called Martello towers. They commence near Hythe in Kent, and are continued, as the coast continues, in the character of the cliffs or the military canal, to Seaford, where the last tower is numbered 74. They are built on the beach at intervals of about a quarter of a mile between them. They are about 30 feet in height, and were surmounted by large flagstaffs. The purpose of these towers was at the time of the threatened invasion of England by Napoleon. At the same time a portion of this low district, from Cliffe End, near Pett, in Sussex, to Shoreham, which was called the Royal Military Canal. It runs parallel to the sea. The breadth is about 60 feet, and the depth 9 feet; it has a raised bank, or redan, on the northern side, to shelter the soldiery and enable them to oppose the enemy with greater advantage; its great height lent it the title of a breach to the sea.

The principal rivers are the Ouse, the Rother, the Adur, the Arun, the Cuckmere, and the Lavant. The Ouse begins at Rylands, a few miles north of the village of Lindfield, at the junction of two streams, one of which issues from Bantrude farm in the forest of St. Leonard, and the other from Sealsfield on the borders of the forest at Worth. After the confluence of the two streams, the river flows near Lindfield, and, pursuing a tortuous course of encroaching on the fields of the West, it proceeds more directly southward, the stream runs by Ifield, Barcombe, and Hausey to the Lewes level, which it enters to the north of the town. After separating the Cliffe from the town of Lewes, it proceeds through the valleys, divides the South Downs, and receives several small streams, discharges itself into the British Channel at the new mouth of Newhaven, forming what is called Newhaven Harbour: the former outlet at Seaford is closed. [SEAFORD.] The river is navigable for large barges for 12 miles from its mouth without the aid of locks, and has with them as far as Lindfield. The waters are used for paper-mills at Lewes and Ifield, and for a large corn-mill at Barcombe.

The river Rother rises near Argus Hill, in the parish of Rotherfield, close under the Forest Ridge. Thence it runs to Mayfield, receiving at Bevilham a large brook that runs from Wadhurst; it then flows in a south-easterly direction towards Kent, passing Etchingham, and receiving a stream that comes from Burwash, it next proceeds to Bodiam. It first touches Kent at Wigsell, in the parish of Salehurst, at the junction of a small stream which rises at Flimwell, near Hawkhurst, and separates the two counties. After the junction with this stream, the Rother forms for some distance the boundary of the parishes of Iden and Downe Forest, containing about 18,000 acres, a fine stretch, and hill and brook all grow well, and portions of the two forests have been planted with success. The whole ridge is the most romantic part of Sussex. It is broken into hills and dales, and is intersected by numerous streams. The highest and most central eminence is 804 feet above the level of the sea; Brightling Hill, 646 feet; and Fairlight Down, 599 feet.

The marsh-land extends across the eastern division of the county from Eastbourne into Kent, with the exception of five miles taken up by the Forest Ridge of Fairlight and the Hastings hills. Marshy tracts also exist on the borders of all the rivers.

The coast at the extreme east of the county is formed of the low marsh-land, which is a continuation of the low land of Romney Marsh. At Pett the Forest Ridge breaks in for five miles, taking in Fairlight, Hastings, and Bexhill. The low marsh-land of Pevensey, forming Pevensey Bay, extends from Beachy Hill to the Downs a short distance to the eastward of the mouth of the River Ouse. The high chalk cliffs of the Downs extend thence as far as Brighton, a distance of 19 or 20 miles coastways, when the low land of the maritime district intervenes and forms the coast line into Hampshire. Pevensey Bay, extending 12 miles, forms several vessels with north or north-east winds, and the latter is much frequented by vessels for water. A lighthouse of the first class was erected in 1825 on the summit of the second cliff to the westward of Beachy Head, nose of the whole. It is the most important of all the ships, which were often driven on shore in storms from the south-west, and coves have been cut in the cliffs between the head and Cuckmere Haven to afford places of refuge to such mariners as may be wrecked on this dangerous coast. The lowest part of the coast from Seaford to the Kentish
new one to Rye. In the year 893 the Danish fleet of 330 sail, under the command of the pirate Hastings, assembled near Boulogne, and sailed direct to the English shores. Two hundred and fifty vessels entered the river Rother or Limene, which is described in the Saxon Chronicle as 'at the east end of the vast wood which we call Andred. The river leat out the Wash, and as they entered in the river they took up their ships as far as the Weald, four miles from the mouth outwards, and thereon destroyed a fort whereon sat a few churis, and which was hastily wrought.' It is remarkable that in the year 1522, one of these Danish ships was discovered embedded in the clay in a field at Northiam, a short distance from the present navigable river, at the west corner of the Isle of Oxney, about two miles from Newenden. The ship was in a perfectly sound and entire state after a lapse of 292 years. Her dimensions were in length sixty-five feet, and breadth fourteen feet, with cabin and forecastle; and she appeared to have originally had a whole deck. She was very strongly built, her bill pieces and keel measuring two feet over; her cross-beams, of which there were five, 18 inches by 8, with other timbers in proportion. In her building was a species of moss peculiar to the country in which she was built. In the cabin and other parts of the vessel were found a human skull, a pair of goat's horns attached to a part of the cranium, a dirk or hunting-sword, and armament; besides three bricks which had formed the fire-hearth, several parts of shoes or sandals, sitting low on the foot, one of which was apparently in an unfinished state, having a last remaining in it, all of them very broad at the toe; two earthy juglets, and a stone panelled piece of board with thirty perforations, probably designed for keeping the lunar months, or some game, with many other ancient relics. The discovery of this vessel affords a singular confirmation of the accuracy of King Alfred's account of the Danish invasions, as described in the Saxon Chronicle.

The Adur has three sources: one branch rises at Toats Farm near Slinfold, whence it flows past Shipley and Knepp Castle to West Grinstead; another rises at Nuthurst, and, running due west, joins the first stream at Bay Bridge, whence they both flow to a place near Ashurst, where they are augmented by the third stream, which rises at Slaugham close by St. Leonard's Forest, and, pursuing a tortuous course, runs through Twineham and Slindon. From Ashurst the river flows in a due southern direction, between Beeding and Bramber, running on the east side of the castle and near the walls, and thence past Botolphs and Coombes to Shoreham Harbour and the sea. [Slaugham church is on the river and the sluice and lock at Moak Bridge in the parish of Shermanbury, to the mouth; and it is celebrated for its mullet, pike, and eels.

The Arun also rises in St. Leonard's Forest, within the rape of Bramber, and passes into the parish of Slinfold: it then flows due west, and receives the sources of a small river called the Western Rother, which rises in Lurgashall parish, and proceeds in a southerly direction to Selsey. At Selsey, the Western Rother is augmented by the waters of another small stream called the Western Arun, described by Harrison as a goodly water, and thereon increased with no small number of excellent and pleasant brooks: it springeth up of two heads, whereof one riseth by west, by the rills which lie towards the rising of the sunne from East Mott, and runneth by Petersfield; another comes from the south-west, and runneth by Chichester. [Six miles and a quarter long, the Arun and the Arun branch are joined by another tunnel: it crosses the valley of the Ouse by a beautiful viaduct: it enters the chalk ridge through a deep cutting and tunnel at Clayton, whence it is carried through a tunnel by the Camden and the London and the Medway. The whole distance from London is 50 miles and 4 furlongs, but seven miles of the Ouse line is used, so that the whole distance of the new line is forty-three miles and a half; the cost of which, including engines and carriages, has been paid by the Camden and the London and the Medway.

A canal called the Arun and Wye Junction Canal, formed under an Act of 53 Geo. III., connecting the Arun with the river Wye, connects an inland communication by water with London. The Arundel and Portsmouth Canal also enters the Arun at Ford, connecting it with Chichester Harbour; and by an Act obtained by the Earl of Egremont in 1791, a canal following the course of the Rother has made a navigable water-communication from Stepasham bridge to the town of Midhurst, with a branch to Hastingsbourne, within half a mile of Petworth.

The Cuckmere is the Foreland River near Heathfield Park, near the spot where William the Conqueror landed. The latter river runs through the battle-field of Hastings.

The Medway also rises in the northern part of the county. Its source is at Turner's Hill, in the parish of Worth, and runs in a southerly direction for small miles, and in the parish of East Grinstead, and through Hartfield and Withyham. It reaches the county of Kent between Groombridge and Ashurst, forming the boundary between the two counties for about a mile, and then turns at Ashurst directly to Kent. It joins the Medway in the parish of Ticehurst, six miles and a half to the west of Lewes.

The London and Brighton Railroad, which was opened on the 21st September, 1841, connects the metropolis with the nearest point of the sea-coast. It branches off from the Croydon Railway to the north of that town, and then proceeds in a direction nearly due south, and at a short distance to the east of the old mail-road: it passes through Merstham, where there is a deep cutting and long tunnel to Horley, and enters the county of Sussex in the parish of Crawley, twenty-eight miles from London: from Crawley it makes a cutting for four miles, and then passes through another tunnel: it crosses the valley of the Ouse by a beautiful viaduct; it enters the chalk ridge through a deep cutting and tunnel at Clayton, whence it is carried through a tunnel by the Camden and the London and the Medway. The whole distance from London is 50 miles and 4 furlongs, but seven miles of the Ouse line is used, so that the whole distance of the new line is forty-three miles and a half; the cost of which, including engines and carriages, has been paid by the Camden and the London and the Medway.
at Prant, near Tunbridge, and runs in a southern direction through Robertsbridge and Battle; the road from London to Brighton enters the county in the parish of Isted, and runs thence through Cuckfield; the road from London to Portsmouth traverses a small portion of the western division of the county, as did that of the Wealden, in the county of Sussex, running parallel with the sea-shore, enters Sussex near Rye, and proceeds to Winchelsea, Hastings, Battle, Lewes, Brighton, Worthing, Arundel, and Chichester, quitting the county for Hampshire, and passing through a part of the county of Sussex and of the county of Surrey of less importance. A road branches from the Brighton mail-road, and leads through East Grinstead, Maresfield, and Uckfield, to Lewes, Newhaven, and Seaford. Another road leads from Tonbridge, through East Grinstead, Maresfield, and Uckfield, to Lewes. The road from London to Worthing enters the county near Horsham, and passes near Steyning and Bramber. There is a road close to the sea-shore from Hastings, through Pevensey and Eastbourne, to Seaford, Newhaven, and Preston, with a branch from Eastbourne at the foot of the Downs to Lewes.

Climate.—The climate of the southern part of the county, near the sea-coast, is mild, and not subject to many variations of temperature. The mean temperature of the year is 51°10'*, the coldest month being February, and the warmest month being July. The general remark which is applicable in this respect to the so-called southern counties is, that the climate of the south-east is generally mild, and the climate of the south-west is generally dry and mild, but the same general remark does not apply to the county of Sussex. The consequence is, that large towns have sprung up to which invalids and others repair for health and relaxation. The climate at Worthing is so mild, that figs are cultivated in the gardens of the palaces in which invalids reside, and that town possesses many advantages for invalids. The mean temperature of the three winter months at Hastings is 43°10', whilst the mean temperature of winter in the adjoining southern counties is generally only 40°20'. The soil of Hastings is a dry sandy loam, with the addition of concretionary matter, which renders it very suitable for invalids. The climate in the south is generally dry and bracing, but in the valley near the centre of the town and to the west the air is more mild. The downs fronting the south-west are bleak, being exposed to the violent winds from that quarter, which prevail for two or three months of the year, during which the atmosphere is frequently charged with saline exhalations from the sea. The higher or northern part of the county, particularly the Forest Ridge, is of considerably lower temperature. In the Weald the circulation of air is impeded by the forests and high hedges, and the climate is cold and damp.

Geology.—The greater portion of the southern part of the county is occupied by the chalk formation, which constitutes its most striking geological feature. The general dip or inclination of the strata is to the south-east, with occasional exceptions. The face of the chalk is marked with fissures or wells, and soaked into deep hollows, furrows, and basins, which are more or less filled with tertiary sand and gravel. In many places quarries have been opened and kilns erected for converting the chalk into lime for the use of the agriculturists, who annually consume large quantities. The Sussex chalk varies in colour from pure white to a bluish-grey; the harder varieties were in great demand among the Normans for building. The walls of several old castles and religious houses were built with chalk faced with Caen stone or flints. The chalk is regularly stratified. The upper division contains horizontal layers of translucent and iridescent nodules with irregular masses in irregular masses and in octahedral crystals. Chalk marl constitutes the foundation of the chalk hills: its outcrop connects the detached parts of the range and forms a fertile tract of arable land, on which are some of the best farms in the county. The chalk marl is also a source of ironstone, which is obscurely traced in the eastern part of the county, but to the west forms a terrace of considerable breadth. The gault, the lowest division of the chalk formation, generally constitutes the surface of the chalk, and may be traced with little interruption, from Eastbourne westward along the whole county into Hampshire, forming a stiffer soil, but very rich.

Next to the chalk the most important formation is the Wealden. It joins the gault and extends through the centre of the county. It is a series of clays and sands with subordinate beds of limestone-grit and shale: it forms an anticlinal axis of considerable elevation, the direction of which is nearly from east to west. This district is an irregular triangle, the base extending from near Pevensey to Seaford; the apex being situated near Harting Comb in the western part of Sussex. The Wealden-clay is a thin, yellowish mud, ranging in thickness from 30 to 40 feet, containing subordinate beds of limestone and sand with layers of septaria of argillaceous ironstone. It forms the subsoil of all the Wealden district, and separates the Shanklin sand from the chalk in the eastern counties. The chalk in the Wealden beds extend on the east and north-east of the county, from Bexhill to Ham Street near Aldington in Kent, forming a line of irregular cliffs 30 or 40 miles in length, from 4 to 40 feet in height. On their first emigrations from beneath the Weald clay these beds consist of sand and friable sandstone, with occasional intersepsions of ironstone and a great intermixture of small portions of lignite. Below this are the great calcareous grit and sandstone, with large concretionary masses of compact calciferous grit or sandstone in three or four layers, each varying in thickness from two to three inches, which was formerly extensively quarried and used for paving and roofing. These beds extend from the western entrance of the county, and the large sandstone beds at Lowood to Hastings, and are separated from the next subdivision by blue clay and shale. This subdivision, called the Worth sands, consists of a series of arenaceous strata, some of which form a fine soft building stone extensively used. The limestone of the Weald is composed of the Ashburnham beds, which occur beneath the Worth stone: they are composed of alternations of sand, friable sandstone, shale, and clay: they are the most par highly ferruginous, and contain large quantities of ironstone and large masses of lignite. It was in the Wealden strata, when wood was abundant and charcoal employed in smelting iron, that the chief iron-works of Sussex were situated, the iron ore being extracted from the ironstone of the argillaceous beds. The iron-works of Sussex were on the axis of the iron-manufacture in England; the consumption of fuel was so great, that more than one act was passed for the preservation of the timber, but the wood still decreased, and by degrees the furnaces were dissolved and the manufacture transferred to districts where coal was abundant. The last furnace, at Ashburnham, was blown out in 1827.

The plastic clay is the foundation of the flat maritime district south of the downs, which extends from near Worth to Buckhams to Bracklesham Bay, thence into Hampshire, forming part of the Isle of Wight basin; and is also seen in insulated patches on Castle Hill, Newhaven, and in many localities.

The London clay, which in some localities includes beds of grey limestone and sandstone, is also found; the clay constitutes the flat maritime district of the south-west part of the county, and the limestone comprises groups of rocks on the coast.

The valleys of all the rivers, and the large levels of Lewes, Pevensey, and Brede, the soil of which is extremely fertile, furnish rich marsh pastures almost equal to Romney Marsh, and are formed of alluvial deposits. These levels are from 3 to 7 miles in breadth, and extend 8 or 10 miles in length.
cropped by sheep, are sweet; but if the downs are not sufficiently stocked, they are soon overgrown with furze and heather. The grasses between the lower or marsh-land is generally one ox to the acre, and sheep are mingled with the oxen. In the Pevensey Level, where there is plenty of water and grass is abundant, there are most cattle; but even here sheep and oxen are reared in considerable numbers, and the milch and dairy cows, and only two bullocks to every four acres, in order to keep the pasture even. After the hay is cut and carried, the pastures are usually occupied by cattle and sheep. Stall-feeding is much and successfully practised in Sussex.

Throughout the whole of the Wealden district, upon the sand as well as the clay soils, the land is extremely poor; and of the 503,000 acres cultivated within the county, 425,000 are situated within this district. The clay is cold and stiff, and the soil is often very sandy, and the land gives no result of drainage; but it produces fair average crops of wheat. The usual rotation of crops is, wheat, oats, clover, or trefoil one or two years, and then a fallow: sometimes peas or tares are substituted for clover. On these lands lime forms a great proportion of the manuring; but, from constant use, it has lost much of its beneficial effect. In this district large commons have been recently enclosed and brought into cultivation at considerable expense; and some parts of the edge of the forests have been planted with fir and other valuable timber trees. The land was previously deeply and frequently drained. When the Rev. A. Young wrote, he estimated the waste lands at 110,000 acres; the quantity has since diminished at least one-third.

The arable land on the Downs consists of thin light layers of soil overlying chalk or clay, and is intersected by stripes of flint pebbles, and is very favourable for the growth of barley; wheat is usually sown once in three years, the course being turnips, barley, clover, and wheat, changing the clover for peas or some other crop the eighth year. In some of the hollows the soil is deeper and more humus, and permits the avowal to allow of its being ploughed quite flat without any ridges or water-furrows: this is the richest Down-land, and the rotation is wheat, barley, and clover, varying the clover, and substituting peas or tares, or turnips, with an intermediate year, and the same land will not bear clover frequently. Along the slopes of some of the hills the soil is of a tough tenacious nature, being a mixture of chalk washed down from the hills by the rains and still clay, and is very difficult to cultivate. In the spring it is extremely heavy, and retains moisture for a long time; but when dried it becomes so hard, that unless worked at the exact moment, when it is dry on the surface and the clods are still moist, there are no means of reducing it to a proper tilth; when carefully manured and prepared, it will bear a good crop of wheat, barley, and beans. The rich arable land in the county is about 120,000 acres.

Like their neighbours in Kent, the Sussex farmers are not ready to adopt improvements in agricultural machinery; they have never much in the way of machinery, and they adhere with pertinacity to the old turn-wrest plough, drawn with four horses on the lightest soils, and, on all the stiffer, by six, or frequently by eight or ten oxen. [Kent.] Almost every Sussex farmer works oxen as well as horses. They think there is an advantage in the treading of the ox on very light soils; and that on very heavy lands in the summer, where great strength is required to break up the soil a good depth, the steady draft of the ox is superior to the quick working of the horse. Steers or young oxen are generally broken in for the yoke at three years old, and are worked till six or seven, when they are turned off to fatten. The drill has been received with some favour, and is in common use near the Downs. Threshing-machines were becoming general till 1831, when a violent gale of Gales, which caused the death of several labourers during the agricultural riots, and have not been again erected. The Sussex farmers are very much behind other counties in the management of their farms. A portion of the land is arable, and the large number of Gales is sufficient for the withdrawal of the Scottish convertible system; yet much might be learned by a careful examination of the system of culture pursued in the Southland.

There is considerable extent in the eastern part of the county: they have been introduced from Kent, and have gradually extended themselves westward. Upwards of 8000 acres are now under cultivation. The produce however is not so much esteemed in the market as that of Kent. There are still many extensive woods in Sussex, amounting altogether to about 150,000 acres. The produce of bark is not so great as it has been, but the demand for hops continues to be great. The hops are cultivated in the underwood and coppices, which yield a greater annual return from the land than if they were grubbed up.

The county is noted for its breed of oxen and of sheep. The Sussex ox bears a strong resemblance to the Devon, being small and well-formed, the head, the horns pushing forward a little, and then turning upward, thin, tapering, and long, not so as to confound the breeds with the long-horns, and yet in some cases a little approaching to them. The eye of the ox is small and a little sunken, the ears long, the skin is very thin, the coat: the throat is clean, and the neck long and thin, although the neck and head are both coarser than the Devon. At the shoulder is the main point of difference and principal defect in the Sussex cattle; the whole fore- quarters are nearly a foot in excess of the rear quarters; this is a natural formation, and the breed is known as the "long legged" or the "long-legged," as a second or even as the principal characteristic. There is much fat upon the legs, which are very fine and thin, and are less set than in the Devon; yet the rump is nearly as straight, and the hind quarters are proportionally not more than a foot less in length than the fore-quarters. The coat is short and dense, and the outer hair is fine but strong, the underhair is of a blood-lay: much deviation from these colours indicates a stain in the breed. This ox holds an intermediate place between the Devon and the Hereford, with all the activity of the first and the strength of the second; with the proportion in the amount of flesh and bone of neither, and a good mixture of both. The hide is soft and mellow, a coarse hard thick hide being considered a test of an ill-bred or unprofitable beast. The coat is a short and slight, and very nearly as white as the stones, but some have reached 216 stones. The breed of oxen was becoming neglected in the county, when, some three or four years since, Mr. Selmes, of Beckley, thinking that they had been neglected in their true value, challenge Earl Spencer to show one hundred head of cattle of any breed, bred by himself, against 100 head of Sussex cattle bred by Mr. Selmes. The challenge was accepted: the prize was awarded to Earl Spencer; but so good was the Sussex stock shown, that the breed has once more come into repute. The Sussex cow is a very inferior animal to the ox: she yields a very small quantity of milk, and is therefore principally kept as a breeder, all the use being made of her for the dairy which circumstances will allow. The milk is of a peculiar kind, being of a small quantity, indicates an unquiet temper, and they are often restless and dissatisfied, prowling about the hedgerows and endeavouuring to break pasture. Nearly all the calves are reared, the males for work, and the females for breeding or early fattening.

The Southdown sheep are among the best for all hill countries where the grass is short; and their kindly properties have caused them to penetrate into nearly all parts of the country. They have a patience of occasional short keep, and an endurance of hard stocking equal to any other sheep, and an early maturity scarcely inferior to the Leicesters, while the flesh is very fine grained and of peculiarly good flavour. It is only within the last 70 years that these sheep have shown so much goodness. They were bad in shape and unkindly feeders when they were first bred by the late Mr. Selmes, of Gales, but since the improvement of the breed, without crossing, raised them to their present worth. The Southdown sheep are polled, and are black or grey on the head and legs. The characteristics of a well-bred sheep are, that the head is small and well-formed, and the placing of the ears is

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**Sussex:**

- Arable land: 120,000 acres
- Oxen and sheep farming
- Sussex ox and sheep resemble Devon with slight differences
- Hops cultivation in underwood and coppices
- Pork: little known
- Oxen and sheep are noted for quality
- Woodlands: extensive
- Crop rotation: seasonal
- Agricultural machinery: limited
- Drilling: common near Downs
- Threshing machines: 1831 introduction
- Farm management: behind other counties
- Hops: large production
- Hop varieties: different
- Sheep: Southdown, polled, black or grey on head and legs
- Oxen: small, well-formed, haunches not prominent
- Breed: strong resemblance to Devon
jecting fibres; the average weight of the fleece is from 2½ to 3 lbs. The number of these sheep on the downs has been estimated at 270,000 in summer and 220,000 in winter, or about one and a half on an average all the year round, but we are inclined to think the estimate too low. On the richer and wet land in West Sussex a heavier sort of sheep, a cross between the Somerset and the Down, is much more used than the pure Down.

The East Sussex sheep is the most famous. Great efforts at improvement were made by the late earl of Egremont, in whose stock was the famous Whalebone blood, and who offered an annual prize at Egdean fair for cults bred from his stock. On the west boundary being a very broad and heavy breed, has been held at Lewes. These efforts have not been attended with much success. The breed is certainly improved, though still far from good.

The largest fairs in Sussex are Horsham, for sheep and lambs on 6th April and 15th July, for horses and cattle on Monday before Whit sextuage, and on 27th November, and for Welsh cattle on 17th November; East Hoathly, on 8th April; East Grinstead, on 21st April and 13th July; Cross-in-Hand (cattle), on 23rd April and 19th November; Crowborough (cattle), on 25th April; Lewes on 5th May and Whit-Tuesday for cattle, on 20th July for wool, and on 21st September and 2nd October for sheep; Burwash (cattle), on 12th May; Arundel (cattle), on 4th May and 17th June; 21st August; Wisches (cattle), on 23rd September; Chichester (cattle), on 26th September; Mayfield (cattle), on 30th May and 13th November; St. Grays (cattle), on 9th June, 19th September, and 11th October; Hailsham (cattle), on 3rd June; the Dicker (sheep), on 23rd July; Petworth (cattle), on 5th June; and South Lancing (cattle), for sheep; Chichester on 4th May, 6th August, 11th October, and (sheep) 20th October; Lindfield (sheep), on 5th August; Egdean (horse and cattle), on 4th September; Finden (sheep), on 1st September; Robertsbridge (hogs), on 23rd September; and St. John's Common (sheep), on 4th October.

**Divisions, Towns, &c.—Sussex has been for centuries divided into six Rapes, a term peculiar to the county, the derivation of which is not satisfactorily settled. Somner derives it from the Latin word ripa, or ripp, Island, a tract or district. Each rape contains several hundreds and other smaller divisions. The county has also been for many years subdivided for all civil purposes into two divisions, the eastern and the western, the former comprising the rapes of Lewes, Pevensey, and Hastings; and the latter the rapes of Chichester, Arundel, and Brabham; and by the act of 19 Hen. VII, c. 24, particularly referring to this county, it is enacted "that the court barons of the said Rape or of the Rape of Seaford shall have power to call a meeting of any number of their barons, and to conduct their barony as long as the time of the rape, and the next time at Lewes, and so to be kept alternus vicibus for ever." After the Norman conquest these rapes were granted to powerful followers of William, each of whom either occupied the old castle within the rape, or built his own; and the same state has been preserved of the castle for the residence of the lord, though a fortification was erected immediately after the Conquest for the defence of the inhabitants. Chichester rape formed part of the Honours of Arundel, and was granted to the same nobleman, who possessed the castle and rape of Arundel. The rapes are as follows:—

**Eastern Division.—I. Lewes rape occupies the centre of the county, and extends from the borders of Surrey on the north, to the Adur on the south, where it is 13 miles in width. Its eastern boundary is formed by the Ouse, by which it is separated from the rape of Pevensey, and its western by the Adur, which divides it from the rape of Brabham. This rape was granted by the Conqueror to his brother Robert de Brus, son by his first wife, daughter of the king, and founded the castle of Lewes and priory of St. Pancras there. With the descendants of Earl de Warren the barony remained till the beginning of the 14th century, and then, in default of male issue, it passed into the hands of the heirs of the Beaconsfield family. It was granted to Sir Richard de Pechineville, 24th April, 1356, but whether as a gift or by purchase is uncertain. The rape comprehends an area of 129,560 acres, and had in 1831 a population of 71,921. When 'Domesday' was compiled it included 10 hundreds and the borough of Lewes. It is now divided into 12 hundreds and the borough, containing 52 parishes. The following are the hundreds:— 1. Barcombe; 2. Buttering; 3. Dean; 4. Fishergate; 5. Holmestow; 6. Lewes borough; 7. Poyings; 8. Preston; 9. Southover borough; 10. Street; 11. Swanborough; 12. Whitsomeborough.
William earl of Eu, son of Robert. In this family it remained till the extinction of the male line on the death of Henry I. in 1194. The heir was his mother Alice, countess of Eu, daughter of William D'Albini, earl of Arundel, whose son by the second marriage with William de Ysenden succeeded her, but in 29th Henry III. the estate was forfeited for his adherence to the king. But the Peerage of England was subsequently restored by Prince Edward, but in 46th Hen. III. it was granted to Peter of Savy, from whom, in 53rd Hen. III. it passed by exchange to John, duke of Brittany, and continued in that house till it became extinct in the person of Joan, widow of Richard of Arundel, who, on his death, inherited the barony in the same manner as Pevensy to John of Gaunt and the Pelhams, but in 23 Hen. VI. the lordship of the barony and castle was separated from the rape, and was granted to Sir Thomas Hoo,爵士, the sixteenth lord Hastings. The rape and castle remained separated till the time of James II., when the barony and castle were repurchased by Sir Thomas Pelham from Henry, third earl of Huntingdon; and in the Pelhams the united honor has continued to the present time. The rape has an area of 154,600 acres; and had, in 1831, a population of 50,239. When 'Domesday' was compiled, it was divided into 13 hundreds: the same number still exists, but the town and port of Hastings, and the ancient towns of Rye and Winchelsea, are now separated. The whole rape has an area of 42,519 acres, following are the hundreds:—33, Balduslow; 34, Battle; 35, Bexhill; 36, Foxesale; 37, Goldspur; 38, Gosworth; 39, Guestling; 40, town and port of Hastings; 41, Hawkesborough; 42, Henburn; 43, Netberfield; 44, Ninfield; 45, town and port of Rye; 46, Tilling; 47, Stiple; and, 48, town and parish of Winchelsea.

IV. Chichester rape is situated at the western side of the county, and is bounded on the north by the county of Surrey, on the east by the rape of Eastbourne, on the south by the British Channel, and on the west by Hampshire. There is an extent of 16 miles of coast, including the headland of Selsey Bill; and from this extreme point to the borders of Surrey the length is 26 miles: the breadth varies from 9 to 13 miles. The hundred of Chichester includes part of the Rape of Arundel, of which they formed a part. It was granted by William to Roger Montgomery, created earl of Arundel and Surrey, a nobleman of extensive possessions in Normandy, who commanded the central division of the tournament army at the battle of Hastings, and who was nearly related through his mother to the Conqueror. The honor was calculated to contain 84 knights' fees, or 54,460 acres, and the city of Chichester, and the castle of Arundel. The earl, following the example of the Conqueror, partitioned his property among his sons, and assigned his English honors and possessions to his second son Hugh: from him it passed, in 1098, to his elder brother, Robert, earl of Gloucester; in 1102 it became a barony in consequence of the earl's revolt. The king settled it on his second wife Adeliza. She subsequently married William de Albini, who, for services rendered Henry II., received a grant of the honor to him and his heirs. It remained in his three lineal descendants; when, on the death of the third without issue in 1243, it passed through the second daughter, Isabel, to John Fitzalan, ninth earl of Arundel and first earl of that house. The Fitzalans continued possessed, except at two short intervals of forfeiture till 1528, when, on the death of Henry, the twenty-second earl, it became the property of his heiress, Mary, who married Thomas Howard, duke of Norfolk: it has since been forfeited, like other estates of that family, but it has been restored to the earls of Norfolk by Chars, thirteenth duke of Norfolk and thirty-fourth earl of Arundel. The rape has an area of 145,840 acres; and had, in 1831, a population of 38,929. At the Conquest there were 9 boroughs in this county, of which the chief is Chichester held for the service of one knight and 7 villeins. It is now divided into 7 hundreds, one city, and one borough, including 74 parishes. The hundreds are as follows:—

49, Aldwick; 50, Bosham; 51, Box and Stockbridge; 52, city of Chichester; 53, Dompford; 54, Easebourne; 55, town and parish of Midhurst; and, 57, Westbourne and Sibton.

V. Arundel rape forms the centre of the western division of the county, and is bounded by Surrey on the north, by the rape of Bramber on the east, by the British Channel on the south, and by the rape of Chichester on the west. Its average length from north to south is 20 miles, its width at the sea-coast 15 miles: it is then contracted to nine miles and a half of sea miles from the sea, but again widens gradually till it has a width of 16 miles on the borders of Surrey. The castle of Arundel was in existence in the Saxon times; and from the Conquest, together with the honor of Arundel, followed the same descent which we have just noticed in Chichester rape. The rape has an area of 132,960 acres, and had in 1831 a population of 31,064. When 'Domesday' was compiled, the rape of Arundel had 8 hundreds, which are now merged in 8 hundreds and one, divided into 56 parishes, 21 of which are in the city of Arundel in the lower division. The following are the hundreds:—

55, Borough of Arundel; 59, Avisford; 60, Bury; 61, Poling; 62, Rotherbridge; and, 63, Westweasewruth.

Vl. Bramber rape is situated between the territories of Arundel and Lewes, and extends from Surrey to the English Channel, a length of 22 miles. Along the coast it has a width of eight miles, which is about the average width of the whole rape. The castle was in existence in the Saxon times, and after the conquest it was granted, together with the barony, to William de Braose, in whose family it remained till the death of the tenth of that name, when his daughter Oliva carried the honor by marriage to John de Mortr, whose descendant in 1198 created duke of Norfolk and Earl of Arundel; he was followed by the last of his direct line, and at the end of ten descent, and the heiress Margaret, who married Sir Robert Howard, carried the estates to the Howards, and laid the foundation of the subsequent splendor of that family. Their descendant is still owner of the honor, which is, therefore, that Howard, of the western division of Sussex. The rape has an area of 116,650 acres, and in 1831 it had a population of 30,113. In the Conqueror's time there were 11 hundreds in this rape; and the following are the 8 new hundreds of the boroughs of Bramber, Horsham, New Shoreham, and Steyning:—

The hundred of Arundel is divided into 7 parishes, which have their particular liberties exempt from the jurisdiction of the county magistrates: 1, the city of Chichester; 2, the liberty of the Cinque Ports, which is partly in this county and partly in Kent; 3, the fitzaldiz of All Saints, St. Clements, St. Mary in the Castle, St. Michael the Holy Trinity, St. Mary Bovilbere. and St. Leonard's, Winchelsea; and parts of the parishes of St. Mary the Virgin, South Hurstling, and St. Mary's Church, to the liberty of the St. Marie, in the parish of Bexhill; 2, the parishes of Hastings, viz. Seaford and Pevensey, the latter of which includes the parishes of Pevensey and Westham, and part of the parish of Hailsham; 3, the ancient town of Rye, which includes nearly one-half of the parish; and 4, the ancient town of Winchelsea, including the whole parish of St. Thomas the Apostle, and parts of the parishes of Pett, Broomhill, and Icklesham. [Cinque Ports.] The hundreds of Battle and of Bexhill, in the rape of Hastings, are also exempt. The inhabitants are exempt from service on juries for the county.

There is only one city in the county, the city of Chichester: one Cinque Port, Hastings: two ancient towns added to the Cinque Ports, Rye and Winchelsea; two members of the Cinque Ports, Pevensey and Seaford; the parishes of Bramber, Horsham, and New Shoreham; the city of Chichester and borough of Bramber, East Grinstead, and Steyning; the market towns of Rye, New Shoreham, and Bexhill; and the boroughs of Battle, Crowhurst, Newick, Wadhurst, and the towns of Bognor, Eastbourne, Mayfield, Newhaven, and Worthing. Of some of these places an account is given elsewhere. [Arundel; Battle; Bramber; Chichester; Hastings; Lewes; Rye; Seaford; Shoreham.] The others are noticed here.

Winchelsea is locally situated in the hundred of Guestling and rape of Hastings, 67 miles from London. According to the editor of 'Magnus Britannia,' the name is derived by
from the Saxon, an angle or corner, and sea, or east land: this explanation well suits the situation of Old Winchelsea, which, before the reign of Henry III., was washed by the waters of the Channel on the south and east, and by the Rother on the north. Of its early history little is known, except that it was of some importance in Saxon times, and that, like its neighbour Rye, it was granted by Edward the Confessor to the abbots of St. Botolph, in Norfolk, and confirmed by William I. and Henry I.; but Henry III., in the 31st year of his reign (1247), resumed possession of it for the better defence of his kingdom, exchanging for it other manors in Gloucestershire. The hamlet, and joins in with Westham. The possessions of the abbey were entered under the manor of Ramesle; Winchelsea is probably the new borough there noticed. At the Conquest it did not form part of the Cinque Ports, but was added before the reign of John. [Crugers Post.] In 1267 William landed here from Normandy, and by his sudden arrival defeated the measures taken in England to shake off the Norman yoke: here also Henry II. landed in 1189, on his return from Normandy; and bishop Simon de Montfort, in 1264, after the defeat of the father at Evesham, intending to bring over foreign troops; and in 1266 he was followed by Prince Edward, who, in 1266, stormed and took the town, putting to the sword the chief inhabitants, who had warmly espoused the cause of the barons. The buildings, of which the walls of the town began to suffer much from the influx of the sea. More than 300 houses were destroyed by the overflow of the sea in 1259. The sea continued its ravages, and had done so much injury, that the inhabitants petitioned Edward I. for a site wherein to build a new town. In the 8th year of his reign, issued a commission to Ralph of Sandwich, his steward, authorising the purchase of a rising hill or piece of ground containing 150 acres, which was then a robe of land, feeble and parish of Eddes- ham. The purchase was completed, an arrangement was made with the vicar to pay him 10l. in lieu of tithe, and the inhabitants of Old Winchelsea took to it by little and little and built it. The ground was divided into 40 square miles, and the parcels in which it was to be traced; and the spacious streets intersected each other at right angles. The new town was walled in by the king, and in six or seven years it was 'mysterily well finished.' Very soon afterwards the calamity, against which the inhabitants had provided, happened. 'In the year of our Lord 1297, in the even of St. Agath, the virgin, was the town of Winchelsea drowned, and all the lands between Clivesend (Cliff's End, Pett) and the vacher of Hith.' The new town continued to be celebrated in poetry in the middle ages, as known from the large proportion of ships furnished to Edward I. Hastings and its members, with the two antient towns, had to furnish the king with 21 ships, and in the apportionment no less than 10 were assigned to Winchelsea. It, a populous town, of populous reignings. It soon became the place of import for French wines, for which massive crypts were built. The harbour was little injured by the overflow that destroyed the town, and in the time of Henry VI. Winchelsea was one of the principal ports of embarkation for the Continent. The new settlement did not escape without the ordinary calamities of towns along the southern coast: it was pillaged and partially burnt by the French in 1356, and received much more serious injury from the Spaniards twenty years afterwards. The town was successively repaired. Henry VIII. raised for its defence the castle of Camber, the ruins of which are still standing: it consisted of a large round tower, which served as a keep, surrounded by several smaller ones connected by short curtains. The town, which had been the constant enemy of Winchelsea, began once more to cause its ruin by deserting the new town; the inlet and harbour became choked up with sand and beach, and although Queen Elizabeth, who took particular interest in it, and who, in 1573, made her sense of its importance by calling it Little London, the trade was soon entirely lost, and Winchelsea fell into decay. It is now little more than a village; the houses round two sides of the principal square and those in the vicinity being interesting, and well worth a visit. In the middle of the last century an attempt was made to establish here a manufactory of cambric, for which an act was obtained (4 Geo. III., c. 37), but the attempt failed. A manufactory of Italian crate succeeded, till it was transferred to Norwich. At present there is no manufacture and very little trade: the population, in 1831, was reduced to 722, inhabiting 143 houses. Winchelsea has never received a charter: it is a corporation by prescription, and was not included in the jurisdiction of St. & E. Winchelsea. The corporation consists of a mayor and jurats, of whom there ought to be twelve; the style is 'the mayor, jurats, and commonalty of the antient town of Winchelsea.' The mayor and jurats hold courts of police and general gaol delivery, and their jurisdiction extends to capital felony. This town formerly sent members to parliament from 42nd Edward III. till the 2nd Wm. IV., c. 45, when Winchelsea found a place in Schedule A, since which it has been added to the electoral district of Eastbourne. The sea, which, near the further side of the glory of Winchelsea few traces remain. Three of the four gateways are still standing, viz. the Landgate on the northeast, the Strandgate on the south, and Newgate to the south-west, but in a very ruinous condition. Of the three churches, St. Peter, St. Stephen, and St. Anthony, only the latter is a church for public worship. Three lofty Gothic arches of clustered columns, formed partly of Sussex marble polished, separate the aisles; the walls are fretted with arches and columns, and the windows are in the pointed style. In this church are three altar tombs of Edward II., which, in mail armour, with their legs crossed in token that they had assumed the cross and marched to the defence of the Christian faith in Palestine. They resemble the tombs in the Temple church, London, and, like them, have been successively augmented by successive owners or the Templars. The Templars were always buried in the habit of their order, and are represented in it on their tombs. This habit was a long white mantle, with a red cross over the left breast; it had a black cap, and the feet fell down to the feet unconfined by any girdle. By the arms on the shield of one knight it appears to be the tomb of a member of the family of Oxenbridge, and another probably belonged to Gervase Ailard, both distinguished families in the town or region, in the time of the Conquest. Besides the churches, Winchelsea had a convent of Grey Friars, founded by William de Buckingham, of whose edifice the choir with beautiful arches and fine Gothic windows yet stands. Here was also a convent of Black Friars or Dominicans, and a prebendary of St. Anthony. These all traces are lost. The living is a discharged rectory, within the archdeaconry of Lewes, of the average net value of 27½ per annum. Robert de Winchelsea, made archbishop of York, was once celebrated for his charity, and his frumsness, was a native of Winchelsea. Pevensey, which gave its name to the rape, and was once formidable for its castle and useful for its harbour, is now an insignificant village with only 49 houses, and had, in 1831, of 640 acres. The Saxon name was Pevenese, and the Norman Povensels. Its first authentic mention in history is in 792, when it was given, together with Hastings, by Beroldus, one of the generals of King Offa, to the abbey of St. Denis at Paris. In the reign of Edward the Confessor it had only 24 burgesses, and yet the port was of sufficient importance to be ravaged by Earl Godwin and his son Harold in 1045, when many ships were taken: it was at that time one of the chief ports for communication with France and Flanders. In the bay of Pevensey William the Conqueror landed with his army from Normandy prior to the decisive battle of Hastings; and it was this port which Swane, son of Earl Godwin, entered with eight ships on his return to England after his abdication of the kingdom of Leo- minster. In the reign of Henry III. the port was still available, but it soon afterwards fell into decay owing to the withdrawal of the sea: the original outlet is now choked up, and the water drained through the breakwater into the sluice. Pevensey, like other places on the southern coast, has been claimed as the site of the antient British city of Anderida, with little more than conjecture to support the claim. The only object of interest is the castle, of which there are many Roman bricks, and much of what is called 'herring-bone work,' from which it has been inferred that this was a Roman fortress. No mention is made of its existence in the Saxon chronicles. But, not erected by the Romans, it was certainly built from the remains of an older fortress. The
...out walls, which constitute the most ancient part of the fortification, enclose a space of seven acres, and are from 20 to 25 feet high. The most on the south side is wide and deep; on the other sides it has been filled up. The exit on the land side is between two round towers, over a drawbridge. Within the walls is another and much more modern fortification, approaching a pentagonal form, with five nearly circular towers, moated on the north and south sides. The town-hall, a building from the time of Rufus's army for six days, protecting Odo, bishop of Bayeux, who ultimately yielded only for want of provisions; and it afterwards successfully resisted the siege of King Stephen, who personally superintended the attack, but met with a gallant an opposition from Gilbert, earl of Clare, that he was obliged to withdraw his forces, leaving only a small body to blockade it by sea and by land. It once more resisted hostile attacks, when it was fruitlessly assailed, in 1254, by Simon Montford, son of the renowned earl of Leicester. Again, when Sir John Polham was in Yorkshire, in 1339, assisting Henry, duke of Lancaster, to gain the crown, the castle, left under the command of Lady Jane Polham, was attacked by large bodies of the yeomen of Kent, commanded by Jack W prentice, who finally captured it, and was speedily and bravely and successfully defended by Lady Jane. The castle remained as a fortress till the reign of Elizabeth; two antient culverins, one of which bears in its face the date 1607, are yet preserved. The town is included in the history and returns to the parliamentary survey of 1675, when the castle was in ruins, and the ground within the walls was cultivated as a garden. Pevensey is a member of the Cinque Ports (CINQUE FORTE), and the liberty includes the parishes of Pevensey and Winchelsea, and 300 acres of the parish of Hailsham. It never had a charter, but is a corporation by prescription, let untocheted by the act 3 and 6 Wm. IV., c. 76. It consists of a baftif and jurats; the style is "the bailiff, jurats, and commonalty of the town and liberty of Pevensey." The last bailiff and jurats held their session and general gaol delivery four times a year, and have jurisdiction in capital felonies, which has not been exercised of late years. The inhabitants had formerly an hospital dedicated to St. John, long since lost. Of the church dedicated to St. Nicholas, the patron saint of the sailors, a portion only remains. The benefice is a vicarage, in the archdeaconry of Lewes, and deanery of Pevensey, of the annual net value, as returned in 1852, of £148. There is a grammar school, a day-school for girls held every day in the church, and there is also a day-school for 50 or 60 boys. The famous physician Andrew Borde, better known as 'Merry Andrew,' was born at Pevensey. Midhurst is a parliamentary borough and market-town in the rape of Bramber, is situated on the Forest Ridge, near the borders of the county of Sussex, at a distance of 34½ miles south-south-west from London. The area of the parish is one of the largest in the county, comprising 8500 acres, exclusive of the portion on which the town itself is built. The name is evidently taken from Hurst, Saxon, a wood, and Ham, a town, although some have derived it from Eorza, brother of Hengist, who was killed in 497, and said to have been buried in the vicinity of the town. The town consists of two streets crossing each other at right angles, with an open space in the centre, in which stands the court-house, a handsome stone building, enlarged by the duke of Norfolk in 1759, for the judges of assizes, who held the assizes on the west or land side, till 1839: the Midsummer quarter-sees for West Sussex are still held in this hall. In this town also is the county gaol, re-built on the plan of Howard in 1775. Each prisoner was to have a separate cell, and the dispensation of food in the House of Correction at Petworth, there have been few committals to Horsham gaol, and it is chiefly used for debtors and for persons convicted. A corn-market, well attended, is held on Saturdays. Horsham is a borough by prescription, and returned two members from the 23rd Edw. I till the passing of 6 Wm. IV., c. 45, when the borough found a place in Schedule B, and has since returned one member. It was once a borough for the purpose of buying five burgage tenements; the whole parish is now included: the number of voters in 1832 did not exceed 257; but the number increased in 1839-40 to 345 occupants of 106 houses and six burgage tenants. The church, dedicated to St. Mary, was built from the earth and stones of a round tower surmounted by a spire, in the early English style of architecture. The benefice is a vicarage, in the archdeaconry of Chichester and deanery of Storrington, of the annual net value, in 1855, of £61. The population in 1851 was 1560. There is a general school, in which the children are taught reading, writing, and arithmetic, and, at the discretion of the school-wardens, the Latin language, founded by Richard Collier in 1532, with a good school-house and dwellings for a master and usher. There is also a Lancasterian school for 200 boys and 100 girls, and an infant-school supported by voluntary contributions. Midhurst is a parliamentary borough and market-town in the rape of Chichester. It is pleasantly situated on a gentle eminence, surrounded by loftier hills overlooking the meandering course of the river Rother as it flows towards the Arun: it is 50 miles from London, and on the high-road from Winchester to Petworth, from which place it is distant 6½ miles. Midhurst is supposed to be the Mula of the Roman road which led from Chichester to the Conquest it formed part of the barony of Arundel; but in the reign of Henry I, four and a quarter knights' fees were erected by the king in favour of Savaric de Bourne and his wife, and the socage of the manor continued to be held for several generations by that powerful family. After the extinction of the male line of the Bourneis, the lordship was granted by Henry VIII. to Sir Anthony Browne, standard-bearer to that king, whose son was created Viscount Monmouth. In his descent the ownership rested with the family of Bohuns till the death of George Samuel, the eighth Lord Montague, in 1793, when it passed to his sister Elizabeth Mary, who married William Stephen Poyntz; and on his death, in 1840, it became the estate of his two daughters, one of whom married Lord Hambden, the other married Sir John Bourne, the 6th baronet, and the other the marquis of Exeter. On a mound on the south bank of the Arun are the ruins of the castle long occupied by the Bourneis: the whole vally, now overgrown with trees, lies within a circumference of 400 yards. Within the walls was a small chapel dedicated to St. Anne. There is a corn-market, well attended, held every Thursday, and a town-hall in which the western sessions were formerly held. Midhurst is a borough by prescription, and had two members to parliament till 1832, when, by the act 2 Wm. IV., c. 45, the number of representatives was reduced to one; and to make up a constituency a widely-extended agricultural district, consisting of seven entire parishes and eleven portions of parishes, within two miles of the borough, and right of the two burgage tenements, of which there were forty-four, and the borough was memorable from the fact that the site of many tenements was marked by stones in the park wall, the buildings having been long destroyed. In 1765 this borough gave its first seat to Charles James Fox, then only nineteen years of age. The new district only furnished 222 registered electors in 1832, and in 1839-40 there were only 261. The church, dedicated to St. Denis, is a small and plain stone edifice in the later style of English architecture: it is the central of the town. The benefice is a perpetual curacy, in the archdeaconry of Chichester, and the head of the deanery of Midhurst, endowed with 400l. private benefaction, and 600l. Royal bounty, with the average net value per annum, in 1855, was 710l. To the Midhurst grammar school, for 12 boys founded by Gilbert Hannam in 1672, and a national school, well supported. The population in 1851 was 1478. About one quarter of a mile east of Midhurst stood the ancient palace of Watendlath, the first seat of the Montagues, built in the reign of Henry VIII., and destroyed by fire in 1793. East Grinstead, which is the largest parish in the county, containing upwards of 15,000 acres, is a market-town and borough, situated on the hill south of Pevensey, near the downs Forest, on the high road from London to Lewes, at a distance of 28 miles from London. The town is pleasantly placed on a considerable eminence, but consists only of one principal street, irregularly built. There
in a market for corn on Thursdays, and a cattle-market on the last Thursday in the month. When the roads in Sussex were well furnished, in the time of Edward II., the nearest points to the metropolis, was selected for the holding of the Lent assizes, but the practice was discontinued in 1799, and Horsham chosen instead, the goal being there. East Grinstead is a borough by prescription, and rested at this time and place. The college was founded by Robert Payne, at which twenty-five boys are educated. In this parish stand the ruins of Brambly House, built in the reign of James I. by Sir Henry Compton, from an Italian model; but it soon fell to decay from the neglect of its subsequent owner. In this parish is Hindbrooke, built for William, forty-second baron of Ambergevney, by Mylne, the architect of Blackfriars Bridge, now sold to the Hon. Charles Abbot, afterwards Lord Chancellor. The church was long without a parson, and, like many other churches, had some stone edifices, with an embattled tower surmounted by light pinnacles, stands on the east side of the High-street. It is in a pure style of Gothic architecture, and was erected in 1823. The property originally formed part of the honor of Arundel, but was given by Aldreda, dowager queen of Edward, brother of Joceline de Louvaine, from whom it passed to the noble family of the Percy, lords of Petworth, and afterwards earls of Northumberland, and ultimately devolved upon Elizabeth, baroness Percy, the present proprietress, heiress of Joceline, eleventh earl. She married Charles Spencer, duke of Somerset, and her daughter Catherine carried the estate to the Wyndhams. The mansion of the Percys backs upon the churchyard. In 1399 Henry de Percy had a licence and upwards of £300. The manor of Horsham was new-founded by the Duke of Somerset, and greatly altered by the late possessor, George O'Brien, earl of Egremont, who adorned its galleries with the rarest specimens of ancient and modern sculpture, and added to the already rich collection of picture. A market-place and court-house is in the centre of the town: it is a neat stone building, erected at the close of the last century by the earl of Egremont, and here are held the Easter and Epiphany fairs for the guidance of the county. One of the first results of the philanthropic Act of 1782 for regulating prisons, procured at the instance of Mr. Howard, was the building, in 1783, of the house of correction at Petworth. It was built on two stories, over arches: there was a cell for each prisoner, and the system of separate confinement was pursued here so successfully as at Horsham till the year 1816, when, in consequence of the increase of prisoners on the termination of the war, the structure of the prison was altered, and the prisoners were employed in the factory. The church, dedicated to St. Mary, was erected about the time of Henry VII., and is a cruciform structure: of the original nave only remains, the rest being a more modern erection. The nave was built in the Saxon times, or at a very early period of the Norman; the interior is magnificently enriched, the whole of the arches, as well as the capitals on the large cylindrical pillars, being profusely ornamented with tiers of mouldings of great variety and beauty. Ethelwulf, the father of Alfred the Great, is said to have been buried in Selsey church. The benefice is a vicarage, in the archdeaconry of Chichester, and descent in order of presentment for patronage is vested in Sir William Elwes, bart., of the town, and in the curate of the same. The school was founded by Edward Fowler in 13th Henry VIII. William Spencer increased the endowments, and Lady Dorothy Shirley built a school-house near the churchyard: the present foundation are very few. The population in 1831 was 2356.

Hailsham is a small town in the hundred of Dill and rape of Pevensey, 24 miles from London on the high road to Eastbourne. The population in 1831 was only 1645. It lies on the line of the ancient road from Hailsham to Eastbourne, and cattle, held on every alternate Wednesday, its proximity to the rich pastures of Pevensey Level making it extremely favourable as a mart. The town is built on a gentle acclivity rising from the flats of the town. At Hailsham, in this parish, a religious house for monks of the Premonstratensian order was founded by Ralph de Dene and Sibilla his wife, but it was afterwards moved to Bayham. A few traces of the old walls alone mark the site. The church is in the later style of English architecture, with a battlemented tower surmounted by light pinnacles. The benefice is a vicarage, in the archdeaconry of Lewes, and deanery of Pevensey.

Petworth is a market-town in the hundred of Rotherbridge and rape of Arundel, 49 miles south-west by road from London. It is on the High road to Chester. It is situated on a eminence above a small stream near the river Rother, from which it is supplied with water, raised by works erected by the late earl of Egremont. The borough property originally formed part of the honor of Arundel, but was given by Adeliza, dowager queen of Edward I., to her brother Joceline de Louvaine, from whom it passed to the noble family of the Percy, lords of Petworth, and afterwards earls of Northumberland, and ultimately devolved upon Elizabeth, baroness Percy, the present proprietress, heiress of Joceline, eleventh earl. She married Charles Spencer, duke of Somerset, and her daughter Catherine carried the estate to the Wyndhams. The mansion of the Percys backs upon the churchyard. In 1399 Henry de Percy had a licence and upwards of £300. The manor of Petworth was new-founded by the Duke of Somerset, and greatly altered by the late possessor, George O'Brien, earl of Egremont, who adorned its galleries with the rarest specimens of ancient and modern sculpture, and added to the already rich collection of picture. A market-place and court-house is in the centre of the town: it is a neat stone building, erected at the close of the last century by the earl of Egremont, and here are held the Easter and Epiphany fairs for the guidance of the county. One of the first results of the philanthropic Act of 1782 for regulating prisons, procured at the instance of Mr. Howard, was the building, in 1783, of the house of correction at Petworth. It was built on two stories, over arches: there was a cell for each prisoner, and the system of separate confinement was pursued here so successfully as at Horsham till the year 1816, when, in consequence of the increase of prisoners on the termination of the war, the structure of the prison was altered, and the prisoners were employed in the factory. The church, dedicated to St. Mary, was erected about the time of Henry VII., and is a cruciform structure: of the original nave only remains, the rest being a more modern erection. The nave was built in the Saxon times, or at a very early period of the Norman; the interior is magnificently enriched, the whole of the arches, as well as the capitals on the large cylindrical pillars, being profusely ornamented with tiers of mouldings of great variety and beauty. Ethelwulf, the father of Alfred the Great, is said to have been buried in Selsey church. The benefice is a vicarage, in the archdeaconry of Chichester, and descent in order of presentment for patronage is vested in Sir William Elwes, bart., of the town, and in the curate of the same. The school was founded by Edward Fowler in 13th Henry VIII. William Spencer increased the endowments, and Lady Dorothy Shirley built a school-house near the churchyard: the present foundation are very few. The population in 1831 was 2356.

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served, in the hundred of Aldwick and rape of Chichester, 67 miles from London. It owes its origin to Sir Richard Hotham, who in 1784 began to erect houses for visitors, and it has been much frequented of late years. The promenade is extensive, and the houses neat. The Boghur rocks, which are only visible at low water, extend to the sea in a curved direction for two miles. Within the memory of man they formed a line of low cliffs along the coast. The lowest part of the rocks is a dark grey limestone, in some instances passing into sandstone; the upper part is silicious. The town is intersected by three streets, in which it is situated, at a distance of 56 miles from London.

The ancient name of the town was Meeching, but when the channel of the Ouse was diverted from Seaford and made to enter the sea in a straight line southward, the old name was commuted: it must have been anterior to the time of Elizabeth, for the haven at Seaford was then decayed. The town consists of one main street, with two smaller ones at right angles, but on the western side of the river, and are cut off from the sea. The harbour is the sole cause of its importance, and it is much frequented, being by far the best tidal harbour between Portsmouth and the Downs. The harbour has been already described. [Seaford.] The mouth of the Ouse, which is protected from the north-east by the detached headland of Goodwin Sands, is where there are the remains of an ancient circular fortification large enough to have contained 5000 men. The river is crossed by a drawbridge, erected in 1794. The inhabitants are chiefly occupied in maritime pursuits, and shipping in the Downs.

It was a station of the Romans, and in 1717 a Roman pavement of white and brown tesserae, 17 feet 4 inches by 11 feet, and a bath, 16 feet long, 5 feet 9 inches broad, and 2 feet 9 inches deep, were discovered. From the existence of these remains and from its situation it was supposed by Dr. Tabor to be the site of the ancient town of Andreda Portus, a station founded by the Romans on the southern coast to check the predatory Saxons; and which has been placed near by, by M. de la Peysson. The town was named after the patronymic of a spacious building, consisting of a nave with side aisles, a large chancel, and lofty antique tower. The living is a vicarage, in the deanery of Chichester, and worth £298. The population is 5604. The population in 1831 was 2726. The South Downs abound with that delicate bird the ortolan, or wheat-ear, and large numbers are caught near this town. Beachy Head, which has been before noticed, has been the scene of two unfortunate encounters to the English: one in 1690, between the combined fleets of England and Holland, under Herbert, earl of Torrington, against the French, an engagement from which Lord Torrington was forced to retire; and the other, in 1706, between three line-of-battle ships—the Royal Oak, the Grafton, and the Hampton Court, which were conveying several merchantmen, and a fleet of nine ships and several privateers, under the command of the famous corsair Du Guesa Ttmon. The Grafton and the Hampton Court were burnt and left abandoned the same day, and were overall the time of Lord Torrington from the action in 1690, is preserved among the Eclesmes MSS. at Bridge-water House.

Mayfield is situated on high ground, in the rape of Penveney, and in the hundred of Loxfield-Caom, 44 miles from London. It is now only a small agricultural town, of one street; but the parish is extensive, including 13,500 acres. The town is remarkable for the palace of the archbishops of Canterbury, who had convenient residences provided for them at easy distances within the South Saxon diocese. The erection of the palace at Mayfield, as well as of the former wooden church destroyed by fire in 1389, is ascribed to the famous St. Dunstan, and so it is called the palace which is now standing are preserved the saint's forge and anvil, and the very traditionary tongs with which this most reverend prelate seized the arch-enemy of mankind. Mayfield was a favourite residence of the archbishops. Provisions of the most palatable kind were kept here in 1322, and Archbishop Mepham, Stratford, and Ispip died here. Of the antient palace the walls and three noble arches in the hall, and some portions of the chambers, one of which bears the date 1371, remain. They are of later date than the time of St. Dunstan. The palace and mansion were surrendered by Archbishop Cranmer to Henry VIII., who, in 1545, granted them to Sir Edward North: they were afterwards alienated to the Greshams, and here Sir Thomas Gresham, who had been a merchant, resided in much magnificence, and entertained in one of her progresses Queen Elizaboth. The church built after the destruction of the wooden pile is still dedicated to St. Dunstan: it is a large building with a lofty spire. The living is a vicarage: it was an appendage to the conventional establishment of the Black Canons at South Malling, and is now a peculiar of the Archbishop of Canterbury, and the annual net value, last returned in 1833, was $834. The population of the parish in 1831 was 2738. Thomas May, the historian of the long parliament, was born at the palace at Mayfield, in 1595.

Newhaven is a small and neat town, near the centre of the county, in the rape of East-wards, in which it is situated, at a distance of 56 miles from London. The town consists of one main street, with two smaller ones at right angles, but on the western side of the river, and are cut off from the sea. The harbour is the sole cause of its importance, and it is much frequented, being by far the best tidal harbour between Portsmouth and the Downs. The harbour has been already described. [Seaford.] The mouth of the Ouse, which is protected from the north-east by the detached headland of Goodwin Sands, is where there are the remains of an ancient circular fortification large enough to have contained 5000 men. The river is crossed by a drawbridge, erected in 1794. The inhabitants are chiefly occupied in maritime pursuits, and shipping in the Downs.

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Sussex is in the Home circuit. The assizes are now held at Lewes, where there is a house of correction: the county gaol is at Horsham. For subordinate jurisdiction, the county is divided into East, South, and West Sussex, the former comprehending the rapes of Hastings, Lewes, and Pevensey; and the latter the rapes of Arundel, Bramber, and Chichester. The justices of the peace, though by their commission appointed for the whole county, confine the exercise of their jurisdiction in the county, over which quarter-sessions are held; for East Sussex at Lewes, and for West Sussex a day or two afterwards, the Epiphany and Easter sessions at Petworth, the Trinity at Horsham, and the Assizes at Chichester. In 1847, when the quarter-sessions were before West Sussex, the petty-sessions held for East Sussex at different places within that division, viz. Battle, Brighton, Burwash, Cuckfield, East Grinstead, Frant, Halsham, Hastings, Lewes, Rye, and Uckfield; and seven petty-sessions for West Sussex, viz. Arundel, Chichester, Horsham, Midhurst, Petworth, Steyning, and Worthing.

From the 1st Edward I. to 12th Charles I. the counties of Surrey and Sussex were united under one sheriff, but they are now divided.

The three great divisions of East and West Sussex are, since the county has been divided by the Reform Act, used for parliamentary purposes. East Sussex returns two members: the election takes place at Lewes, and the nine polling-places are Battle, Brighton, Cuckfield, East Grinstead, Frant, Halsham, Hastings, Lewes, and Uckfield. West Sussex also returns two members: the election takes place at Chichester, and the seven polling-places are, Arundel, Chichester, Horsham, Midhurst, Petworth, Steyning, and Worthing.

At Arundel stands the town of Arundel, the Cinque Port of Hastings, and the boroughs of Brighton, New Shoreham, and Lewes; and one member each for the ancient town of Rye, and the boroughs of Arundel, Horsham, and Midhurst. The total number now returns to the county the same number of members as before the Reform Act it was twenty-eight. By that Act Bramber, East Grinstead, Seaford, Steyning, and Winchelsea, returning two members each, were disfranchised, and Arundel, Horsham, Midhurst, and Rye reduced to two members each, and were removed altogether from the county. The county returns one member each for the ancient towns of Chichester, the Cinque Port of Hastings, and the boroughs of Brighton, New Shoreham, and Lewes; and one member each for the ancient town of Rye, and the boroughs of Arundel, Horsham, and Midhurst. The total number now returns to the county the same number of members as before the Reform Act it was twenty-eight. By that Act Bramber, East Grinstead, Seaford, Steyning, and Winchelsea, returning two members each, were disfranchised, and Arundel, Horsham, Midhurst, and Rye reduced to two members each, and were removed altogether from the county.

The maritime coast of England was inhabited in the time of Caesar by a rude but warlike people, the Belgae, that they were numerous in Sussex, and held the district with ample defences and fortifications, is evident from the number of camps and forts that are here found. The Roman roads were designed to facilitate communications along the hills from one end of the county to the other. The principal posts were at the extremity of some point nearly surrounded by water, and often defended on the land side by a vallum and trench. The towns of Arundel, Bramber, Lewes, and Seaford were thus conveniently placed. They had also stations at short distances on all the ground which was not covered with the immense forest or Cotentlaid constituting the Weald of Sussex. Petworth, Charing Cross, and Chichester, were near the Roman road, and the routes passed through Lewes, at Clapham New Worthing, and indeed on almost all parts on or near the slopes of the Downs, the remains of ancient British earthworks have been traced. The pottery is of the coarsest and rudest kind, being nothing more than the bluish-grey clay of the country moulded by the hands, ornamented by the indentations of the fingers or by oblique strokes or gashes made by some blunt instrument, and then dried in the sun without fire. Perhaps still stronger evidence of the number of the ancient Britons may be found in the present multitude of ancient names, which in many cases are either pure British, as Glynde (glyn, a vale), or mixed with the Saxons, as Penhurst (pen, a head), Cuckfield (cocc, princeps), and Southsea (thee, a river), and the retention of many words not generally in use elsewhere. Of the eight principal towns, seven are on or near the present county boundary, and the eighth on the line of a Roman road from London to Chichester, one branch from London entered this county at Pulborough near Horsham, running to Chichester on the west, and the other branch went through the eastern part of the county by Wadhurst, Mayfield, and the neighbourhood of Beachy Head, or, as conjectured with much reason by Dr. Brusale, through Lewes, to Chislefield, Lewes, South- ease, and Newhaven, in all of which places there are ancient encampments and British names.

On the first landing of Caesar in Britain, he does not seem to have set foot in this county; and it was not till nearly a century after, in the time of Claudius, that the British warlike nation, the Belgae, was conquered. The British power in the Roman empire was afterwards attempted by the Romans themselves, and they set out on an expedition to the east, through the Mediterranean, where they were defeated by the Britons of their own country. The Britons of this county were conversant with the Roman language, and were acquainted with the art of making glasses and pottery.

From Mutuantonis the road once more took the hills and proceeded to Anderida. Along the whole line the earthworks at Wolstonbury, Ditchelling, Hollingbury, Whitehawk Hill, and Mount Caburn, clearly mark the route.

The situation of Anderida, as we have already seen, was given rise to much speculation. It was not till 1812 that the site of the town was discovered, and it was placed by Camden at Newenden in Kent, but that position has been long since abandoned by antiquaries. It was another of the fortresses to keep a look out towards the sea, and the 'Notitia, or Survey of the Weald of Sussex, by Sir John Stow, shows that it was garrisoned by a company of the Abizle, with their captain. Newenden never was a seaport, or useful for such a purpose. More modern authorities have been
Sussex, Hengist and Danes. In the two last places the remains of Roman villas have been found, and any one of them would be unobjectionable in point of distance; but the evidence of Richard of Ciren-
cestre's map, which places the city on the west side of a river was at variance with the line from the Downs into the
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Edward was induced to follow the Londoners into the low ground; Montford, perceiving the mistake, attacked the rear of the enemy. The Prince Edward returned from the pursuit of the Londoners, he found to his dismay that the royal army had been put to the rout, and that his father had precipitately retreated to the priory of St. Pancras. After reinforcing the castle, on which the city was built after the fire of 1666, the Prince Edward continued to follow the remainder of his followers to join his father. The immediate result of the battle was the Mise of Lewes, and the ultimate issue the seizing of the first parliament of representatives permanently dissolved, in the name of the Prince Edward in consequence of its occupation by Simon de Montfort, son of the earl; and Montford himself made a fruitless attempt to seize Pencyre.

Jack Cade, whose insurrection in the reign of Henry VI., consisted of a building scheme, was enclosed in Lewes, and decided to make a move into Sussex (Canter), and is reported to have been killed at Cade Street in Heathfield, where a stone monument has been raised to mark the spot.

In the subsequent reigns till Henry VIII., the whole of the Sussex coast was exposed to the incursions of the French, who landed and burnt Brighton, Seaford, Rye, Wellinghse, and other towns. During the civil wars the castles of Amberley, Arundel, and Bodiam, and the city of Chichester were besieged and taken by the parliamentary forces.

Although the whole of the county was parcelled out by the Conqueror among his followers, and subordinate manors were established in almost every parish, it appears certain that the old enclosed and walled towns, as well as the present urban centres in winning over the common people. There are nearly two hundred words of pure Saxon origin, little known in other parts of the country, which are in constant use among the natives of Sussex; whilst the blue eyes and light hair of the people bear the same resemblance to those of the Saxons as any other race.

Of castellated edifices not already noticed or referred to, the most remarkable are Amberley, Bodiam, and Rotherstome, and the castellated mansions of Bridge, Alfriston, and Cuckfield. The cloisters of the priories, situated on the east side of the river Arun, at a distance of four miles from Arundel. The bishops of Chichester had a residence here from the early Roman times, but the present castle was built by Bishop Rede, who was consecrated in 1369, and obtained a licence, in 1 Richard II., to fortify his castle. The ground-plan is nearly a parallelogram. It was built after the French manner introduced by Edward III. after the battle of Poitiers. A square tower rose at each corner: the gateway, the grand feature in the west front, is of clinker, and is surmounted by a semi-circular arch; it was flanked by two projecting round towers, which had machicolations or deeply projecting parapets. The south side is defended by a fosse, over which a bridge leads to the gateway. The palace is built of brick, and has two similar projecting pavilions, built in the upper court by Bishop Sherburn at the commencement of the sixteenth century: in one still called the queen's room there are some curious paintings, the side panels exhibiting a series of ten female figures, and the ceiling having the portraits of six warriors carved in wood. The castle was taken and dismantled in 1643, by the parliamentary forces under Walier, and since that period it has not formed the residence of the bishops. Bodiam Castle is of the same era and built after the same French style as Amberley. It stands at a distance of four miles from Robertsbridge, on the river Rother, at the extreme eastern side of the county. It owes its origin, in 1386, to Sir Edward Dalyngrudge, a valiant knight and captain in the French wars. He built himself a mansion and a round tower on the site of the Klooster, lords of Bodiam. The hearse of the founder carried the castle to the Lewknors, from whom it passed by alienation to the Websters, and then to the Fullers, the present owners, who have taken great pains to prevent its further decay. The site for the present mere or moat was a square, with four round towers at the angles and three squares one between them; the great gateway is flanked by two square towers, and the entrance is defended by a machicolation and portcullis. The castle was surrounded by a broad moat, which is supplied with water artificially conducted from the Rother, and assumes the appearance of a small lake. Upon the outside wall, above the gateway, are three escutcheons, after the French manner, bearing the arms of Bodiam, Wordeux, and Dalyngrudge. The interior was fitted up for a baronial residence. In the time of Charles I., P. C., No. 1467.

Lewknor, the proprietor, was a staunch royalist, and his castle suffered the fate of Amberley, being dismantled by parliamentary order. The remains of Lewknor, discovered a few years later, was built in 1 Henry VI. (1423), by Sir William Fennies, treasurer of the royal household. It stands on the borders of Pevensey Level, a few miles north of that ancient castle. It is one of the oldest brick buildings in England, and every century it has been held under various title. In the last centuries it has stood the brunt of the weather and exposure to the sea vapours without injury. The building is nearly a square, 214 feet from east to west, and 206 feet from north to south. It is two stories high, and consists of a tower at each corner, and another in the centre of the east and west faces. The road-way on the southern side is flanked by lofty octagonal towers 84 feet high, machicolated and embattled; the approach is by a drawbridge over a fosse which surrounds the castle. The building was used for a long time as a gateway and defence. The Fennies were awarded it by the Lords Dacre of the south. On the failure of male heirs, in the 37th year of the reign of Elizabeth, the house and estates devoted upon Margaret, the wife of Sampson Lennard, and her descendant sold them in 1720 to the Nylons, whence they came to the Rev. Robert Hare, who in 1777 sold the ancient tapestry and furniture, pulled down the roof, and wholly dismantled the castle, leaving the walls alone standing. The Edgington family now reside in the building, and have constructed a long range of spacious apartments. The Fennies were afterwards leased to the Lords Dacre of the south. The site of the castle is very extensive, and is included in the park of Lewknor.

The site of Lewes castle was first mentioned in the reign of Edward I., and was granted to Sir William Zouche, a close friend of the king, to hold as his own. It was a large and well-populated town, and was the seat of one of the Archbishops of Canterbury. It was the site of a fortress in the time of the Norman Conquest, and was the last of the castles held by the Normans in the south of England. It was the site of a priory, and was the seat of the Bishops of Chichester. It was the seat of the Earls of Lewes, and was the site of a castle which was destroyed by the Scots in the time of Edward I. It was the site of a priory, and was the seat of the Bishops of Chichester. It was the site of a castle which was destroyed by the Scots in the time of Edward I. It was the site of a priory, and was the seat of the Bishops of Chichester.
houses in Sussex, the revenues of which exceeded 200l. It was founded in 1176, by Alured St. Martin, for monks of the Cistercian order; and at the time of its surrender by Thomas Taylor, on 6th April, 1539, the gross revenue of the house amounted to 2724. 9s. 6d., and the clear income to 2481. 10s. 6d. The work of destruction has been so perfect, that the site is as if this house were never. The ruin, as above mentioned, consists of the chapel in the south wall, an archway attached to the west end, and the easterly gate, overgrown with ivy, are all that can be seen, though the foundation can be traced for some distance. The ruins have been converted into a farm-house.

The religious edifices in the county are generally mean and small. Those which are exceptions and most worthy of note are the cathedral [CHICHESTER], the churches of Arundel [Arvndl], and New Shoreham [New Shoreham], and of Broadwater. The latter is a cruciform building, with a low square tower in the centre and a round corner turret. The chancel has a groined roof. The arch under the tower next the nave is pointed and enriched with Saxon zigzag ornaments; the arch entering the chancel is semicircular and in the richest style of Norman ornament. The capitals of the lofty columns are surmounted by palm-branched, an ornament introduced by the Crusaders.

(Ordnance Map; Mantell's Geology of the South-East of England; Dallaway's Western Sussex; Horsham's History of Sussex and Lewes; Watson's History of the Earls of Warren and Surrey; Tierney's History of Arundel; Excursions in Sussex; Lee's History of Lewes; Stockdale's Sketch of Hastings, &c.; Estancelin's Histoire des Comtes D' Eu; Bay's History of Chichester; New Shoreham [New Shoreham]; Cooper's Glossary of Sussex Provincialisms; Rickman's Gothic Architecture; Burrell MSS.; Hayley MSS.; Parliamentary Reports.)

### HOUSES.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arundel</td>
<td>5,207</td>
<td>6,033</td>
<td>41</td>
<td>167</td>
<td>3,211</td>
<td>1,597</td>
<td>1,225</td>
</tr>
<tr>
<td>Bramber</td>
<td>5,073</td>
<td>5,717</td>
<td>54</td>
<td>238</td>
<td>2,803</td>
<td>1,768</td>
<td>1,146</td>
</tr>
<tr>
<td>Chichester</td>
<td>5,161</td>
<td>6,073</td>
<td>31</td>
<td>203</td>
<td>3,376</td>
<td>1,313</td>
<td>1,234</td>
</tr>
<tr>
<td>Hastings</td>
<td>8,046</td>
<td>9,556</td>
<td>72</td>
<td>221</td>
<td>4,411</td>
<td>2,608</td>
<td>2,373</td>
</tr>
<tr>
<td>Lewes</td>
<td>3,558</td>
<td>4,457</td>
<td>82</td>
<td>121</td>
<td>2,008</td>
<td>959</td>
<td>890</td>
</tr>
<tr>
<td>Pevensey</td>
<td>7,560</td>
<td>9,867</td>
<td>40</td>
<td>191</td>
<td>7,075</td>
<td>2,110</td>
<td>1,239</td>
</tr>
<tr>
<td>Chichester (City)</td>
<td>1,514</td>
<td>1,701</td>
<td>16</td>
<td>109</td>
<td>1,061</td>
<td>404</td>
<td>3,636</td>
</tr>
<tr>
<td>Lewes (Borough)</td>
<td>1,454</td>
<td>1,604</td>
<td>4</td>
<td>62</td>
<td>92</td>
<td>912</td>
<td>603</td>
</tr>
<tr>
<td>Brightonstone(Town)</td>
<td>7,709</td>
<td>8,608</td>
<td>280</td>
<td>547</td>
<td>106</td>
<td>1,146</td>
<td>3,236</td>
</tr>
<tr>
<td>Totals</td>
<td>45,595</td>
<td>55,716</td>
<td>620</td>
<td>1,859</td>
<td>22,450</td>
<td>17,489</td>
<td>12,777</td>
</tr>
</tbody>
</table>

By the census of 1841 the number of houses inhabited was 54,066; uninhabited 3674; building, 253.

**County Expenses, Crime, &c.—The amount raised for the relief of the poor and other county purposes in each of the four periods ending March, 1801, 1813, 1821, 1833, and 1840, near the period of each census, was:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1801</td>
<td>206,225£</td>
</tr>
<tr>
<td>1813</td>
<td>333,333£</td>
</tr>
<tr>
<td>1821</td>
<td>275,450£</td>
</tr>
<tr>
<td>1833</td>
<td>319,547£</td>
</tr>
<tr>
<td>1840</td>
<td>167,414£</td>
</tr>
</tbody>
</table>

These averages are all above the general averages of England and Wales.

The amount expended in actual relief in each of the years ending 30th March, 1834, 1839, and 1840, was as under:

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1834</td>
<td>246,626£</td>
</tr>
<tr>
<td>1839</td>
<td>142,410£</td>
</tr>
<tr>
<td>1840</td>
<td>144,126£</td>
</tr>
</tbody>
</table>

Being a decrease of 7s. 6d. a head in 1840 as compared with 1834. There was also a decrease of 76 per cent. in the law charges; and 71 per cent. in money expended for other purposes. In 1834 Sussex was the most populous county in England, the rate of money per head of the population expended in relief being higher than in any other county: and it is now exceeded by Wiltshire alone, where the rate of expenditure is 11s. 1d. per head.

The sums expended in each of the years 1834, 1839, and 1840, were divided as under:

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1834</td>
<td>£263,460</td>
</tr>
<tr>
<td>1839</td>
<td>£269,365</td>
</tr>
<tr>
<td>1840</td>
<td>£270,400</td>
</tr>
</tbody>
</table>

**Expended for relief of poor.** £264,626 £142,410 £144,126

**Suits at law, removals, &c.** 7573 1269 1873

**For all other purposes (except county-rate and registration).** 30,937 13,387 8,332

**Total parochial rates, &c., expended in 1840.** £263,460 £142,410 £144,126

During the year ending 30th March, 1841, the poor-law

**£253,436 £137,066 £143,933**

**Payments towards county-rate, 1840.** £10,561

**Payments under registration and parochial assessment act.** £1,647

**Total parochial rates, &c., expended in 1840.** £267,141
Within the county, in each of the three septennial periods ending with 1819, 1826, and 1833, was 922, 1841, and 2548; being an average of 132 annually in the first period, of 263 in the second, and of 332 in the third. The average number for the last 7 years, ending 1840, has been 3141, or a yearly average of 449.

Of the number committed for trial in 1840 there were—

<table>
<thead>
<tr>
<th>Offences against the person</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>For offences against property with violence</td>
<td>37</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>For offences against property without violence</td>
<td>373</td>
<td>66</td>
<td>439</td>
</tr>
<tr>
<td>For malicious offences against property</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>For forgery and offences against the currency</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>For other offences not included in the above</td>
<td>12</td>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

Total 468 75 543

The number of persons against whom bills were not found by the grand-jury and who were acquitted on trial was 157; of these 30 were for larceny; 63 were for simple larceny; 39 larceny by servants; 18 housebreaking; and 13 for common assaults. There was one person sentenced to death who had his sentence commuted to transportation for life. Of the remaining convicts the sentences were—

| Transportation for life | 15 |
| Impisonment for 2 years and above | 79 |
| 1 year and above 6 months | 26 |
| 6 months and under | 269 |

| Whipped, tried, and discharged | 399 |

The ages of the persons accused were—

<table>
<thead>
<tr>
<th>Aged 12 years and under</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>16 years and above 12</td>
<td>48</td>
<td>9</td>
</tr>
<tr>
<td>21 years and above 16</td>
<td>106</td>
<td>21</td>
</tr>
<tr>
<td>30 years and above 21</td>
<td>149</td>
<td>23</td>
</tr>
<tr>
<td>40 years and above 30</td>
<td>79</td>
<td>13</td>
</tr>
<tr>
<td>50 years and above 40</td>
<td>46</td>
<td>6</td>
</tr>
<tr>
<td>60 years and above 50</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Age above 60 years</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Age could not be ascertained</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Their state of instruction was as follows:</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could neither read nor write</td>
<td>148</td>
<td>25</td>
</tr>
<tr>
<td>Read or write, but write imperfect</td>
<td>306</td>
<td>47</td>
</tr>
<tr>
<td>Read and write well</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Superior instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction could not be ascertained</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

The number of electors qualified to vote for the county members in Sussex at the registration of 1841-42 was, for the eastern division 2094, and for the western division 3678; being about 1 in 15 of the whole male population in that year. The numbers registered in 1839-40 were thus divided—

<table>
<thead>
<tr>
<th>East Sussex</th>
<th>West Sussex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeholders</td>
<td>3482</td>
</tr>
<tr>
<td>Copyholders</td>
<td>681</td>
</tr>
<tr>
<td>Leaseholders</td>
<td>95</td>
</tr>
<tr>
<td>Occupying tenants</td>
<td>977</td>
</tr>
<tr>
<td>Trustees</td>
<td>29</td>
</tr>
<tr>
<td>Holders of offices</td>
<td>40</td>
</tr>
<tr>
<td>Registered for joint qualifications</td>
<td>48</td>
</tr>
</tbody>
</table>

Total registered in 1839-40 5316 3122

or an increase in East Sussex of 492 and in West Sussex of 464, over the numbers registered for the years 1833-36.

The number of savings-banks in Sussex is 13. The number of depositors and the amount of their deposits as they stood on 30th of November in each of the last three years were as follows—

| Number of persons charged with criminal offences | 2 Z 2 |
The well-defined district comprehended within these boundaries contains an area of about 1665 square miles of land and 38 square miles of water, or 1,193,940 acres of land and 24,230 acres of water. The length of this county in straight lines varies from 60 to 42 miles, and the breadth from 42 to 4 miles. It lies between 57° 25' and 58° 37' N. lat., and 4° 35' and 5° 29' W. long.; the mountain Ben Klibreck, which is nearly in the centre of the county, being in 56° 14' 0" N. lat. and in 4° 24' 32" W. long.

There are no islands along the east coast of Sutherland, but there is a number of small islands along the west and north coasts, of which four are inhabited. Oldsay, Calva, and the island of Handa, are the largest of these islands on the west coast of the county; Handa is removed from the mainland by a wild grandeur of its cliffs, in which innumerable sea-fowl hatch their young. Along the north coast, the lofty peaks of the Stack and Skerries islands, belonging to this county, are conspicuous in clear weather at a distance of some miles from the coast. Island Hoon, the Rabbit Islands, Island Roan, and Island Neave, or Holy Island, are situate close to the coast, and form, in some instances, natural breakwaters, and afford protection for shipping.

The name of Sutherland came from the Northmen, who frequently visited the Scottish shores in and before the twelfth century, and made early settlements along the coasts of Caithness. The present county of Sutherland was, with reference to the position of Caithness and Orkney, the southern boundary of the Norwegian and Danish settlements, and hence the origin of the name of Sutherland, which was applied to a large and important territory, known to the Celtic inhabitants of the Highlands, and still exclusively called, in the Gaelic language, Cattay.

Sutherland is a mountainous and pastoral district. The whole of the interior of the county consists of a succession of mountains and ranges of hills, and some extensive moors, broken and separated by several straths and mountain glenis, diverging from the principal valleys, which open towards the coasts. Among the mountain-ends of the county is one of great altitude, which contains several mountains among the highest in Great Britain, separates the west and north coasts of the county from its southern shore and valleys, and continues along the nearly parallel line of the indented shores of the Atlantic and North seas. The detached and conical mountain of Suiilean, in Assynt, forms the characteristic and picturesque southern pillar of this lofty range; while Ben More of Assynt, which attains an elevation of 3431 feet, Ben Loyal, Ben Meall, Rynie, Stack, Arkle, Fionnvar, and Ben Spannich, mark with their towering summits the prolongation of this range to within a few miles of the North Sea. The coast near this point trends almost due east from the bold headland of Cape Wrath, which is connected parallel to the coast, by the same elevated ridge, which an equal and prominent and equally elevated mountains of Ben Hope, Ben Loyal, Ben Stornio, and the two Ben Grians, to within a short distance of the county of Caithness. The alpine character of this extensive range is also preserved in the magnitude of many lakes at the base of the mountains, in the depth and abruptness of the openings and passes, in the expansion of widely-spread mountain sides and formidable masses and bogs, and in a variety of romantic valleys and rugged glenis and hollows. The western and northern districts of the county, thus separated by the mountains of the interior from the southern and eastern parts, are unlike them in appearance and character. Thus, the two parishes of Assynt and Isbister, in Caithness, and Durness, in Sutherland, are characterized by the harshness and severity of the climate, and even in comparison with the wildest districts of the Highlands of Scotland, for the general ruggedness and inequalities of the surface, and for the vast number of rocky eminences and of second-rate lakes which characterize the district. But whereas the northern part of the country continues, in a more modified form, and softened by an open tract of arable land in the parish of Durness,—by the picturesque beauty of Tongue, and its improved and fertile expanses of waste land,—the southern part of the county, the eastern and southern parishes are marked by several extensive and pleasant valleys, by less elevated

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**Infant-schools**

- **Number of children at such schools:**
  - Males: 4,190
  - Females: 796
  - Sex not specified: 238

- **Total number of children:** 4,190

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**Schools established by Dissenters**

- **Infant-schools:** 63
- **Daily-schools:** 962
- **Sunday-schools:** 287

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**IV. Maintenance of Schools**

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**Religious Distinction**

- **Infant-schools:** 2
- **Daily-schools:** 18
- **Sunday-schools:** 69

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**Library of books attached to schools:**

- 353, containing 17,364 volumes.
S T U

357

S T U

This county is abundantly watered by many rivers and their tributary streams, partly flowing from extensive inland lakes, and partly formed by the junction of innumerable mountain-streams. All these rivers have these sources, supplies, and auxiliary streams within the county of Sutherland, with the single exception of the subordinate streams of the Eanack and Carron, which flow through the county of Ross and alloying the estuary of the Fleet. The salmon fisheries of the larger rivers are valuable; but with the exception of the intricate and narrow channel of the Frith of Dornoch and the short estuary of the Fleet, none of them are sufficiently large to be navigable. The Oykill is the chief river of the county: its source is in Loch Aish, a picturesque lake to the east of Ben More of Assynt. The Oykill forms the boundary between the two counties of Ross and Sutherland, and, after being augmented by the Eanack, Cassley, Shin, and Carron, expands into an estuary, the ancient Portculatea, but now generally called, at its mouth between Torbetness and Embo, the Dornoch Frith. The river Halladale, the Strathy, the Naver, the Torrisdale, the Hope, and Dinnard all flow into the North Sea; and the Inver, Inver, and Kirkig enter the Atlantic on the west coast. The interior and western districts of Sutherland are remarkable for the great number of fresh-water lakes, which in general lie at the bottom of the hollow spaces in the rocks and masses of the rocky western coast. Loch Shin, with the almost connected smaller lake called Loch Grian, is 18 miles in a straight line from its eastern to its western extremity, and forms one, and the largest, of a singular chain of lakes, which in the exception of a few miles between each of them, extends from near the head of the Dornoch Frith on the east coast to Loch Laxford, a salt-water loch of the Atlantic on the west coast. The other lakes forming this chain are Loch Killnord, More, Dirich, and Stack, all large and situated amidst very romantic scenery. Loch Assynt, another sheet of water, surrounded by some of the highest and most picturesque mountains of the county, is the largest lake along the west coast; Loch Hope, Loch Maidie, Loch Naver, Loch Loyal, Loch Carr, and Loch Vealoch are conspicuous on the north coast and in the centre of the county; and Loch Badanloch, Loch-na-clar, Loch-nakuen, Loch Truderscaig, Loch-air-clyn, and Loch-in-ruar are situated in the inland and western part of Kishorn, Balnockie, Loch Bhoite, and several smaller lakes are situated among the high grounds along the east coast. The rocks of the interior of Sutherland and a considerable portion of the west coast are granite districts, chiefly in the parish of Rogart, and on the confines of Caithness, exhibit great masses of granite, and the high hills of Loth are composed of porphyritic granite of different colours, yellow, reddish-brown, and grey. Senetie abounds on the north shore of Loch Shin, and is composed of the rocks of granite marble. The parish of Assynt also contains extensive masses of white marble, and many of the high hills in that district are of quartz. Limestone is the prevailing rock in the parish of Durness, with the exception of the headland of the headland of the north side of Cape Wrath, which terminates in the Cape Wrath headland, and in which quartz, red-sandstone, and conglomerate prevail. The headland of Stoir in Assynt is also formed of high cliffs of red-sandstone, with pebbles imbedded in it. Along the east coast of the county the high hills of Golsie, and its neighbourhood are formed of old conglomerate, and the low parts of the east coast between Golsie and Helmsdale are composed of solile sandstone of a beautifully white and fine-grained variety, sandstone-flag, limestone, and coal. Veins are very seldom found in the trachyte rocks, and strata of Sutherland: but veins of quartz sometimes occur in the granite and micaceous schist; and veins of calcarious spar and of tremolite are found in the marble near Loch Shin; and in the rocks of Kildonan large veins of a rude kind of porphyry are rare. The cultivated soils along the east coast are principally formed from the decomposition of sandstone rocks, which often approaches in its nature to shale, and the soils of the straits opening along the east coast seem to be derived from the decomposition of transition sandstone and breccias. Sutherland, in common with the north of Scotland, has a variable climate, but along the sheltered east coast it is very mild and salubrious. The high parts of the interior and the west coast are subject to continued and heavy falls of rain, the injurious effects of which to the human constitution appear however to be counteracted by the purity and invigorating quality of the mountain and sea breezes, and the protective properties of the gale of gales, which the superabundant rain accumulates. The valleys are in general well sheltered and cheerful: but in July and August they are often oppressively warm and sultry; and this lies among the base of these northern hills. The air is free from gnats, which in calm weathers harass men and cattle so much as to render outdoor work during the heat of the day almost intolerable. The arable land of Sutherland lies principally close to and along the east coast; and there the most important system of Scottish husbandry is carefully acted upon. The Dunrobin breed of Highland cattle belong to this county, and are well known, and eagerly purchased in the southern counties. Sheep of the pure Cheviot breed are the most important stock, and the staple produce of the Sutherland high grounds. The interior uplands and some of the
valleys are divided into extensive sheep-farms, which are well stocked; but which in summer and autumn, and during a portion of the spring season, could support a much greater number of sheep, provided a supply of winter food could be depended upon. The present permanent sheep stock of the county is estimated at 170,000 sheep, and the yield of wool about 42,436 lbs. of wool, which is generally purchased by the English manufacturers. On the arable farms the grain raised is limited to barley, oats, and occasionally wheat and rye: the barley of Sutherland is equal in quality to the best in Scotland, and weighs on an average from 55 to 56 lbs. per bushel; large parcels have been sold of late years that weighed 57 1/2 lbs. Turnips are extensively raised, and chiefly consumed on the field by sheep during the winter season; and potatoes, turnips, and other vegetables are mostly employed for home consumption, and form the chief article of food for the great bulk of the population. The proper rotation of cropping is well understood, and strictly attended to on all large farms, which are laboured under the five-years' shift of husbandry, having annually one-fifth part of the land in fallow, turnips, potatoes, or other green crop; one-fifth part in grass one year old; one-fifth part in grass two years old, and not more than two-fifths part in corn crop.

Sutherland is inhabited by natural woods of birch, alder, and occasionally oak; adorn the steep sides and water edges; but the extensive forests of Scottish pines that, at a remote period, covered the greater part of the interior of this county have long ago totally disappeared. The extent of plantations, of the extent of which there is not great; but, at the date of writing this article, very extensive plantations of fir, larch, and other forest trees have either been completed or are in progress on the estates of the duke and earl of Sutherland, which, in the county, are reckoned as the thirty years' war of Napoleon mant the country, and cover comparatively barren moorland with valuable timber.

Several parts of this county have been celebrated for centuries as deer forests; and there the red deer are still found in large numbers, being a distant relative of a species not equalled or excelled by any other part of Scotland. Roe deer are also common in the woods; and game of all kinds, being protected, is abundant in all parts of the county. The county has no manufactories; but that valuable native industry, the fisheries, is prosecuted with vigour and success, and promises to continue to add most materially to the prosperity and wealth of the district. The west and north coasts are singularly well adapted for the establishment of cod and ling fisheries on a large scale; and the numerous salt-water lochs and bays in these quarters are annually, but at irregular periods, frequented by shoals of the rich and valuable description of herrings common in similar places along the west coast of Scotland. The east coast of the county, again, is considered the most eligible for nearly two months of July, by those immense shoals of herrings that regularly pass along the eastern shores of Caithness and the opposite coast of the Moray Firth; and which, by the regularity of their appearance and course, have occasioned the permanent establishment of fishing and curing villages and stations at many otherwise inhospitable parts of the east-coast. Thus the village of Helmsdale, in this county, has arisen, from a hamlet of three or four cottages, within the last thirty years, to a bustling, industrious, and prosperous village, with all the means of future increase and success, from the active prosecution of the herring fishery; and here, of late years, no less than 40,000 barrels of herrings, on an average, have been cured annually within the Helmsdale district, of which nearly one-half were usually sent to Scourie. When the herrings of lochs are taken along the coasts of Sutherland, and sent to the London market; and fishing-smacks from the Thames regularly frequent the fishing-banks off the northern and west coasts, and convey to London cod of the best quality, this village receives more attention from the conquerors of the world than from its original inhabitants.

Formed roads were only commenced in this county in the year 1811; and since that period the whole circuit of the county of Sutherland has been provided with roads of the best materials; being improved by embankments and mounds necessary to connect and complete them. Cross-roads lead through the interior parts, and across the county from one extremity to the other, and the whole are kept in the best state of repair, without levying a single toll. The original plan of the public works was continued after the public expense was defrayed by an equitable assessment borne equally by landlord and tenant.

Dornoch is the only borough within the county, and joins with Wick, Kirkwall, Tain, Cromarty, and Dingwall in returning a member to parliament. It was anciently the seat of the bishopric of the diocese of the earldom of Sutherland, and was ultimately included in the diocese of the earldom of Sutherland, which was in the year 1833, and of the late duchess-countess of Sutherland in 1839. Dornoch derived its origin from being the seat of the bishopric: being without trade or manufactures, it is a small town, and important only as being the county town. The larger villages of the county are Helmsdale, Brora, Golspie, and Bonar; but Lock-Inver, Sowowie, Kirkboll, Port-Skerra, Port-Gower, Spinningdale, Ciaishmore, and Embo are called villages, and form small districts of agricultural cultists.

The population of this county, by the census of 1841, is stated at 94,666; which shows a decrease of 882 from the population of 1831. This arises from the absence of manufacture, and the comparatively small number of the rural population. Sutherland returns one member to parliament; and of the thirteen parishes within the county the duke and earl of Sutherland is proprietor of the whole lands in ten of those parishes, and that part of the parish of Brora which is in Sutherland; and the other lands in the remaining three parishes. The antiquities of Sutherland consist principally of rude structures of ages so remote as to be lost even to tradition, but which, if closely studied, might be interesting in relation to the period of the post-Patriarchal visitation; and the elder, and three or four battle-axes, and old battle-fields have reference to the invasions of the Danes; and the foundations and ruins of old towers and strongholds attest the existence of feudal usages. The building of the county is chiefly of stone, and also of interesting and instructive. At the earliest period of Scottish history, the thones of Sutherland, then the only title of nobility in Scotland, figure conspicuously in the transactions of the kingdom; and in the thirteen century their descendants appear as earls of Sutherland, and the succession of this ancient family has continued in unbroken direct descent down to the present time, the late duchess-countess of Sutherland having, by a solemn decision of the House of Lords in 1771, when she was an infant, been adjudged to the heir male of the king. The lands of Sutherland, as heir of the body of William, who was earl of Sutherland in 1375, the present duke of Sutherland, eldest son of the late duke and duchess-countess, is now the twentieth earl of Sutherland, in direct lineal descent from Earl William of 1276, and is consequently pre-earl of Sutherland.

(Communication from Scotland.)

SUTLER, or SUTLEDGE. [Henderson, p. 219.]

SUTTER (Sut, from the German sat, good), properly means a chaste and virtuous wife, and in ordinary cases is applied to one who burns herself on her husband's funeral pyre. The term has subsequently been employed by Europeans to denote the act of self-immolation as practiced by the Hindus, or the burning of the wife. When the husband perishes in battle, his widow, if she is a Brahmin, cannot be burned with him, but must be immolated in the presence of her in-laws, and the officiating priests. She may not even be permitted to take food if she is married to a man of inferior rank; and her future dies with her husband, and she is burned, as the Hindus say, by love of God. Some have even been burned, when the husband has been the subject of much controversy over the Spartan virtue of her sex. The term has also been employed to denote the act of burning oneself in the presence of a husband, or in the presence of her husband's heirs. In the latter case, she is burned as the means of averting the evil influence of the dead. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyre, and the ashes are used as an amulet for the protection of the living. She is burned on a pyr

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who refused to conform to the custom. This is also the view taken by our missionaries, as Elphinstone (History of India, i. 358) justly observes, if the motives were one of so general an influence, the practice would scarcely be so rare. It is not improbable that the doctrine of transmigration generally held throughout India may have had after some time in the establishment, the corpse of the Suttee. A widow by burning herself with the corpse of her husband was to be immediately released from further migration, and enter at once on the enjoyment of Heaven, to which by this act she would also entitle the deceased. The explanation that the Swarga (Sahagamana) would be sufficient to induce a faithful wife to sacrifice herself. But though this barbarous custom may appear to be antient, it is in fact comparatively recent. It is only a century since it was introduced into India, whether legal or religious, do we find any mention of it. It is certain that Manu, in his directions to Hindu widows (book v.), does not even allude to it. This circumstance is urged as a proof of the high antiquity of the code known by the name of this legislator. This, as well as the fact that those passages which have been brought forward as supporting self-imolation are either spurious or perverted from their meaning, may lead us to suppose that the Suttee arose at the same time as the prevailing worship of Kali. The idea of the supposed woman's soul being driven into the earth, and thick green stakes laid across to form a kind of bed, upon which are laid abundance of dry faggots, bump, clarified butter, and other combustibles. The husband now makes his last adieux to her, and, taking with him some red cotton on both wrists, puts two more combs in her hair, paints her forehead, and puts some parched rice and cowries into the end of the cloth which she wears. While this is going forward, the dead body is anointed with clarified butter and bated by the priest. The widow, with some combs in her dress, is dressed in new clothes. Ropes and another piece of cloth are spread upon the pile. The widow walks seven times round the funeral pile, strewing parched rice and cowries, and then she ascends the pile, or rather throws herself up on it.

From returns published in a parliamentary paper (Hindoo Widows, 178, sess. 1830), it appears that the numbers who were burned or buried alive in the presidency of Bengal was 533 in 1825, 575 in 1826, 572 in 1824, 630 in 1825, and 518 in 1826. In the presidency of Bombay the number was 158 for the four years ending 1827. No return is given from the Madras presidency. In the province of Benares the average age of widows who immolated themselves varied from five to seven years, in Calcutta from four to five years, from 1820 to 1825: none were under twenty, and several exceeded eighty years of age.

( Ward's Hindoo, ii. 99; Elphinstone. History of India, \textit{v.}Charterhouse.\\n
SUTON. [NOTTINGHAMSHIRE.]

SUTON. T. [CHARTERHOUSE.]

SUTURE, in Anatomy. [Articulation; Skeleton]

SUTURE, in Surgery, is the method of sewing together the edges of wounds; and the term is also applied to the threads with which the operation is effected.

The only wounds in which the application of sutures can be beneficial are those of the edges, if held together, are likely to unite. They are therefore improper in all congausted wounds, in the majority of lacerations, and in those wounds which extend so deep that, though the superficial parts might be brought together, the deep ones would re-open. But they must always be placed and kept in contact without any painful stretching of the parts adjacent to them, sutures are, if applied with proper cautions, by far the most convenient and secure method of obtaining a speedy reunion.

The necessity of these sutures is that they should not be allowed to remain in the wound till they excite acute inflammation, and that, if from any cause the wound become infected, they should be at once removed. In general thirty-six hours are sufficient for wound sutures. They are, in superficial parts to unite so far that it does not need sutures to keep its edges in contact. After this time therefore the sutures should be removed; and in cases of deeper wounds, and of amputations, it will not be necessary to remove them more than three or four days from the operation.

The several kinds of suture employed in surgery are named the interrupted, the uninterupted, and the twisted.
In the firsts, the edges of the wound, having been duly cleaned, are brought together by a single stitch, which is then tied apart. A threaded curved needle is passed through the skin from one side of the wound to the other, so as to include about one-third of an inch of healthy skin on each side of it, and then, the needle being cut off, the two threads are tied together to form a knot over the line of the wound. This is repeated as many times as the length of the wound requires, and the spaces between the successive sutures, where the edges of the wound usually gape a little, may be held together by stickings. The latter alone will suffice when the sutures are removed.

In the uninterrupted or glovcr's suture, a single thread is carried alternately from one side to the other along the whole length of the wound, the needle being passed through the skin at the end of each stitch at the side of the wound towards the adjacent healthy skin. There are only two kinds of cases in which this mode of suture can be usefully employed, namely, first, in certain wounds of the stomach and intestines, when those organs are to be returned into the abdomen, and it is of the highest importance that every part of the opening into them should be closed, so that their contents may not escape; and, secondly, in ordinary cuts of the palm of the hand or the fingers, where, the cuticle being thick, the uninterrupted suture is the only method of closing the wound. In the case of a fine needle and thread to be used, it is not necessary to pass them so deep as the cutis, and no inflammation can be excised by the holes made in the cuticle.

The dressing is employed on wounds in those parts of the skin which are very loose, and in which it is desirable to obtain a very exact union by the first intention, such as the lips, the eye-lids, the cheeks, &c. Instead of thceads, one or more pins are passed across the wound and through the adjacent skin, and the edges of the former being brought together, are retained in their places by coils of silk wound like the figure 8 upon the projecting ends of the pins. This is the mode of suture commonly employed after the operation for hare-lip. (HARE-LIP.)

The purpose it is of the highest importance that the dressings over them should be very light and cool. It is probably owing to the neglect of this caution, and of that already given respecting the time during which they should be retained, that some surgeons have been led to regard sutures as more mischievous than beneficial, ascribing to them the injuries produced by the injudicious management of other parts of the treatment.

SSUVOROV-RYMNIKSI, ALEXANDER VASILIEVICH. Prince ofItalian, field-marshai and generalissimo of the Russian forces, one of the most celebrated generals of the eighteenth century, was born in Finland, on the 13th November, 1730. His family was of Swedish origin, and, before its settlement in Russia, was called Shaw. Suvorov's father, a Captain of the Cossacks, distinguished himself in the army, and had been promoted to the rank of general-in-chief in the reign of Catherine I. Upon his retiring from service, he was made senator, and lived at his country-seat in the south of Russia, upon a moderate income which his services had procured him. The predilection he had for a military life induced him to put his son in the army at the age of thirteen years. Young Suvorov remained in the regiment of Semenov until 1754, when, in the twenty-fifth year of his age, he obtained a lieutenancy in a regiment of the line, and distinguished himself so much, that three years after the date of his commission he was raised to the rank of first lieutenant, and in 1758, when the war with Prussia broke out, he was entrusted with the command of a regiment of Musketeers of the Imperial Guard, ill-suited to the active spirit of young Suvorov, whose energies demanded a far wider field of action. He begged to be sent on active service. His petition was granted, and in 1759 he was present at the battle of Kesslenzk. He continued in the rank of first lieutenant until the death of the emperor Elizabeth, when the Russian troops were recalled from Prussia. Suvorov, who during the war had received the approbation of his superior officers, was dispatched in 1763 to the court of Peter the Great, to assist the Russian army in its operations. A letter of introduction brought him before Catherine II., who named him colonel of the Austrian regiment of infantry. Five years afterwards he was advanced to the rank of general-p公示, which were engaged in warfare with the confederaton of Barry in Poland. Here he first showed how worthy he was of the command entrusted to him: in a time almost incredibly short he dispersed the armies of both Pulaszskis, took Cracow by storm, and obtained so many advantages over the enemy, that the success of the campaign has chiefly been attributed to him. On his return he was made major-general, and such was the fame he had already acquired, that in 1768 the Emperor of the Turks, Felicissimus Rumiantzov was commander-in-chief. Three victories by Suvorov over the troops of Mustapha III., which were commanded by the khans of the Crimean, prepared for the complete defeat of the Turks, and at the effect of the battle of General Kamensky, a fourth victory put an end to the contest. This battle, one of the most singular in this war, was fought at Kasludgi, about the end of June, 1774. In the mean time Pugachev, a Cossack of Don, had joined the Russians with a force of 10,000 men, and on the 13th of June, 1774, he ordered his regiment to be taken off the credit of his actions, and could show that his skill as a tactician was fully to equal his courage. Suvorov was well aware of the enormous responsibility which now lay upon him. So far as he could, he wished to avoid the war; but, as he is accused of having sacrificed too many lives, he cannot be charged with not exposing his own. It was in this war that he first made almost exclusive use of the bayonet, which afterwards so much distinguished the Russian troops. In the battle of Kinsburn, in 1778, he ordered his crimson plumed standard, hence called Suvorov's standard, to be thrown away their knapsacks and to attack the enemy with the bayonet. The Turks, who occupied a position much stronger than he suspected, repelled the repeated attacks of the Russians; Suvorov himself was wounded, his horse shot down, and the Cossacks of his division were driven from the field of battle. In this critical moment Suvorov, regardless of his wound, mounted his horse, overtook his flying horsemen, and, throwing himself in the midst of them, exclaimed: 'Rum, cowards, and leave your general to the mercy of the Turks.' The effect was instantaneous, and notwithstanding the disadvantages he had to contend with, the battle was won. Nevertheless his courage frequently led him into difficulties which he could have avoided, as at the siege of Dunemarch, where he ordered his columns to be withdrawn without his having the advantage in the field of battle. In September of the same year the Prince of Coburg was surrounded by the Turks; and the Russian army stationed on the river Rymnik was in imminent danger. Suvorov reached the spot with the speed of an eagle; the armies met on the 22nd September, and the Turks were completely defeated. It was for this victory that the emperor Joseph II. raised him to the rank of count of the empire, and Catherine to the dignity of a Russian prince with the name of Rymnik (i.e. lie of the Rymnik).

The fortress of Ismail had in the course of this war withstood repeated attacks from the Russian armies. Prince Potemkin at last gave orders to Suvorov for its reduction. Suvorov, who, in view of the situation of his forces, could see no chance of success in an assault, contrived to throw his soldiers the plunder of the place, and ordered them to give no quarter. The evening before the storming, he said to his soldiers: 'To-morrow morning, an hour before daylight, I shall rise, say my prayers, wash myself and have breakfast, and then crow like a cock, and you will storm according to orders.' The signal was given, and the army began the attack. The Russians were twice forced to give ground under the overwhelming fire of the enemy; at last they had to give up the assault. But many of the Russians were killed or severely wounded, and ten thousand were made prisoners after the slaughter had ceased. Suvorov's report to the empress on this occasion is laconic: 'Pray, great empress, be to you: the fortress is taken, and I am in it.' Eight days were required in reducing the dead. Suvorov took a horse to supply the place of
the one he had lost in the action, and this was all the share he had in the booty.

In 1792, when peace was made between Russia and the Porte at Yassy in Moldavia (January 9), the empress Catharine was present, as a witness of the capture of Yekaterinoslaw, the Cossacks, and the lately acquired provinces round the mouth of the Dniester. Kherson was the chief town in these districts, and there Suvorov remained for two years. In 1794, when the Poles revolted, Suvorov received the chief command in the highest activity of the insurrection. He gained several victories over the insurgents, and the storming of Praga, which was taken after a desperate fight of four hours, and which opened him the gates of Warsaw, on the 9th of November. Two camps we of the ears of the wheat.

Catherine made him a field-marshall, and gave him a staff of command made of gold, with a wreath of jewels in the form of oak-leaves, the diamonds alone of which were valued at 5,000 roubles.

In 1795 Catherine died, but Suvorov did not lose any of his authority. In 1799 the emperor Paul gave him the command of the troops which fought in Italy against the French. The Russian armies combined with those of Austria, and Suvorov was appointed to the chief command.

His brilliant victories, as those of Piacenza, Novi, and Alessandria, and the activity with which he took from the French all the towns of Upper Italy, procured him the title of Prince Italinski. In consequence of a change in the plan of operations he again retired to Petersburg, in order to help Prince Korsakov in the neighbourhood of Zürich. Through mismanagement on the part of the Austrians, Suvorov came too late, and Korsakov was defeated and killed at the battle of Muclern. This misfortune, as well as the want of energy shown by the Austrians, obliged Suvorov to retreat as far as the lake of Constance. His object was to join the army of Korsakov.

The French generals tried to prevent this junction. Suvorov was surrounded by 20,000 men and entirely encircled in the valley of the Reuss. On the 28th of September he threw himself into the valley of Schlacken, and led his men, one by one, along a path, known only to chamois hunters, over rock and horror, over deep abysses, into the village of Mulden, where Korsakov's troops were stationed. The extraordinary behaviour of the Austrian army and the apathy of the court of Vienna roused the indignation of Paul, and he recalled his forces. The protestations of Suvorov were in vain, and his representations regarding the necessity of the war being continued were rejected. Meanwhile the emperor had given orders for the reception of the generalissimo. He was to make a triumphal entry into St. Petersburg, and apartments were prepared for him in the Imperial palace. But Suvorov refused to enter St. Petersburg, when a severe illness obliged him to stay at his country-seat in Lithuania. The emperor's own surgeon was dispatched to him. Yet in the midst of the preparations for Suvorov's triumph, he was ill, and his friends feared for him with all the anxiety so trifling as to be scarcely worth mention; but the imperial favour from a man to whom Russia was most deeply indebted. Suvorov learnt in Riga that he was in disgrace; nevertheless he continued his journey to St. Petersburg, and was received in the house of a niece. Sixteen days after his arrival at St. Petersburg, on the 18th of November, 1800, Suvorov died, at the age of seventy.

His funeral was celebrated with great solemnity, and 15,000 of his soldiers accompanied his body to the grave.

The emperor Alexander erected in St. Petersburg, in 1801, a colossal statue of the first of Russian generals. Suvorov was an extraordinary man. Though thin and of a weak constitution, he maintained himself in good health by severe exercise and cold baths. He slept on a bed of straw or hay, under a light blanket, and his food was the same as that of his soldiers. Change in his fortune did not induce him to change his diet. His wardrobe consisted merely of his uniform and a sheepskin. Owing to this temperance and the command of the required degree of reserve, he was very strict in performing all the duties of the Russian church, and compelled all who were under his command to observe them with the same strictness: on Sundays he used to go to church, and turn grey with cold, but he never gave the signal for a battle without making the sign of the cross and kissing the image of St. Nicholas. He was equally firm in his resolutions and true to his promises; and his quickness of decision showed itself in the short and laconic style of his orders. A studied conciseness was likewise observable in his conversation, where, as well as in his writings, he frequently used rhyme. His courage and uncouth manners made him the favourite of his soldiers, for whose good he had peculiar talents. Although he used to say that the whole of his tactics consisted in the two magic words, Stupay i bey! ('Advance and strike!') he showed in the course of his career great skill in the art of signal-making. He was always ready to apply all petty regulations with regard to dress and the like. His well-known remark upon Paul's introducing pigtail and curls, that curls would not serve for guns, nor queues for lances, might have been dangerous to him had it come from another man. That he was not a frequent drunkard is shown in his expressions and composed in his behaviour, he gave orders to his adjutants to check any rising passion by reminding him of the orders of field-marshall Suvorov; and he always obeyed. Once he forgot himself so far as to strike a soldier; the adjutant came up to him and said, 'Field-marshall Suvorov has ordered that no one should be overcome by anger.' 'Did he say so?' said Suvorov; 'well, we must obey.' Courage, determination, and quickness in executing his plans, were qualities which he has scarcely ever had an equal. He has been accused of cruelty and blamed for want of deliberation; nevertheless he is one of the few generals who never lost a battle.


His son General Alexandrovitch Suvorov was drowned in the Rhine, in 1809; and his nephew Prince Sergius Suvorov, a man of remarkable talents, has lately been appointed commanding officer in the Circassian war. Having received a foreign education, he does not speak Russian, a circumstance which has to be lamented in the only descendant of the great Suvorov.

Suzoos, a nation of Western Africa, whose territory extends north-westward from the neighbourhood of the river Kissée, beyond the Rio Pongas, and nearly as far as the Rio Nunez, or from 9° 24' to 10° 40' N., and in the widest part from 12° 15' to 13° 36' E. long. The Suzoos have another country, their native seat, more inland, beyond the sources of the rivers Kissée and Scaries, probably as large as this, but which is less known and the limits less determined, and the inhabitants more barbarous than those of Benna Suzoos. The two territories might have been described as one before the continuity was broken by a tribe of Mandingoes, who drove out the Suzoos and established themselves upon the lands; and the first native tribe only who at any time occupied the country. The word Suzoos, however, is introduced first to indicate the Suzoos possessed a nation called the Bagoes, who were once masters of the whole of the Rio Pongas and of the country between that river and the Rio Nunez, as well as of a considerable line of sea-coast extending from the Rio Nunez southward to the river Demba, opposite the island of Lore. They have still a few villages among the Suzoos, but are chiefly confined to the coast and to the islands, upon the largest of which (Tamara) they have plantations and villages. The Suzoos capital is Kamadie, upon the river Pongas. The Suzoos are under a chief or king, but all matters of much importance are debated and concluded in the palaver, or national council, whose decisions are generally inoperative if the king withholds his consent. In critical times, extraordinary palavers are held, attended sometimes by as many as 3000 or 4000 men. Three-fourths of the people are slaves to the other fourth; and it is said that there is a marked difference, not only in carriage, but in appearance, between the two classes. The men in particular are generally of inferior personal appearance to their neighbours the Bagoes, Buloms, and Timannes; there is more of a yellow hue in the complexion, the lips are more thick and the nose flatter. Like them, they are hairless and bald, and then let it grow. The good and habits of life are the same as those of the other pagan negroes of this quarter. All of them are fond of spiritual liquors, but the Suzoos have a peculiar drink, which they...
use as beer, and which they prefer to palm-wine. It is tolerably palatable, and is obtained by the fermentation of the ashes of a plant called Yin-ying infused in water. The population of the Suzoo towns ranges from 1000 to 3000; they are commonly surrounded by a lofty palisade of bam-
boos, or by a wall of sun-dried bricks protected by a sloping thatch from the rains. The Suzoos are mostly pagans, although Mohammedanism has been making progress among them, through the example and exertions of the Ma-
 IDC's. They apparently pay a kind of worship to a god, and never undertake an affair of importance without sacri-
ficing to him a bullock, with which a feast is afterwards made. White they deem a colour agreeable to their god; and they are said to pray, for that reason, with a white fowl or a slice of white bread in their hand. It is a secret society called Semo, the members of which have a language of their own, and are marked by incisions (chiefly abdo-
mental) in a peculiar manner. The novels live for a year apart in the woods, where not but their identity is trad-
true. The Suzoo language is to the ear the most agree-
able of the African dialects, approaching in softness to the Italian. It is not only spoken throughout a considerable space near the coast, but is also the language of the exten-
scive district called Jallokadu, and is understood by great numbers of the Foulahs, Mandingoes, Bullomms, and Timan-
nees. The church missionaries have composed a grammar and reading lessons in this language, and the Gospel of St.
Matthew has been translated into it.

From the "To the River Sierra Leone; Winter-
tombertow's Account of the Native Africans in the Neigh-
bourhood of Sierra Leone; M'Lachlan's Travels into the Bagre and Suzoo Countries; Missionary Register.

SWABIA. [Swabia.]

SWAFFHAM. [Norfolk.]

SWALLOWs, Hirundo. a family of insectivorous
birds, in which the powers of flight are very highly de-
veloped, but which have but one wing, and the tail comparatively weak.

Belon placed the Swallows at the end of his birds, imme-
diately following his Petit Mouchet or Moineau de Haux, which is engraved with a fly in its mouth. Brisson
arranges the Swallow, together with the Goak-sucker, in his fifth order, of which he says: "The bill is very small, compressed horizontally at its base, and hooked at its end, its aperture being larger than the head. This order stands between that containing Urops and Promeropa and that containing Tangara and the Finches.

The genus Hirundo is placed, in the twelfth edition of the Systema Naturae, between Caprimulgus and Pipra, in the second division of the Passeres, viz. Carinurostres, Mandi-
bul. superior, infra inunctu. In Latham's method it is also placed between the latter and Caprimulgus, in which it is best characterized much in the same way. In Leopoldi's arrangement, Hirundo and Caprimulgus form his third order of birds (first subclass and 1st subdivision) with Bec très court, standing between the antecedent order, consisting of those with long bills (the last genus of which is Molucca) and the preceding one, comprising birds with Bec à septic, the first genus of which is Galactornis. M. Du-
màr confuses the Swallows in his sixth family (Planirocos- tres or Ommalambani) of the Passeres. Meyer's Chlidoni-
(its sixth order) consist of Hirundo, Cypselus, and Capri-
mulcnes. The same genera appear in Illiger's method as his family Haintes, the last of his order Ambulatores. In Couvier's system the Swallows and Goatsuckers, including the next family Planirostres, is placed in the same order be-
 tween the Dentostraces and Contrastaces. M. Viselliott'Che-
idones are placed between his Blactoreses and his Myothores, in his second tribe (Ameadactyla). M. Temminck's eighth order, embracing the Swallows and Goatsuckers, stands be-
tween the two last orders, consisting of the Goatsuckers and the Pigeons. In M. Latreille's method the first genus of the first family (Liostraces) of his second order (Passaerescens) contains the Goatsuckers and Swallows.

It is thus evident that the family, which compose the first tribe (Passeraces) of his second order (Insectores) are distinguished from those of all the other, except the Tenui-
rostraces, by their habit of feeding on the wing. From the latter, or the Suctorial Birds, which meet them at one of the extremities of the island, and which are the Synal troes, and also on the wing, they are distinguished, he observes, by their animal food, which they take by their bills or in the
gape of their mouths; while the Tenuirostraces live chiefly upon vegetable juices, which they extract with their tongue. The Tenuirostraces," says Mr. Vigors, in continuation, "depend so much on the powers of their wings, exhibit a proportional deficiency in the strength of their legs. These members are not only shorter and weaker than in the other Perches (the typical families of the Tenuirostrace here again being excepted, which correspond with them in this partic-
ular also), but they have their external toes in general to such a degree united with the internal, for this most part, as far as to the second phalanx, that they are deprived of the free play of the joint; and the bird is thus rendered nearly incapable of using its legs in walking, or for any purpose besides that of more perching.

With them, a group of the typical family appears deficient; for the toes of the genus Cypselus, being all placed in front, seem to assist the bird only in suspending itself, where other birds would perch. All the families of the tribe are again united by a striking conformity in their mode of nidification. They deviate from the manners of the Perches in general in forming their nests on the ground; or, if, like some of the Hirundinides, they choose elevated situations for that pur-
pose, they build up the exterior of their nests with earth ex-
cemented into a solid substance, and thus preserves a similarity in their construction to those nests which are actually formed on the ground. The two typical groups of this tribe may be observed to be separated from the other three by the short-
toedness of their bills and the wider gape of the mouth. Their mode of flight is different from their prey charkers: they receive it in full flight into the cavity of their mouths, which remain open for that purpose, and where a viscous exudation within, and a strong reticulated fence of secre of the tongue, extends, as anterior, smaller, while, on the other hand, the longer-billed families catch their food by their bills. The series of succession in the tribe may be stated as follows, the typical families being placed in the centre:

Meropide, Hirundinide, Caprimulghide, Toddide, Holcynide.

After alluding to the differentiation between the Meropide and Hirundinidae, Mr. Vivors notices the union be-
tween the latter and the Caprimulgidae. [Night Jars, vol. xi., p. 224.]

M. Latreille makes the Latiostaces the first family of his second order (Passerescens); and the first division of the family comprises the Goatsuckers and the Swallows. In the method proposed by M. de Blainville in 1815 and 1821, and developed by M. Lherminier in 1827, the Martinae (the Passeres), includes four superfamilies, of which the two last (Caprimulghidae and the last superfami-
Leventis (Caprimulgus, Linn.) the eighth of the first sub-
class (Normal Birds), the sixth being the Colibris (Trichili, Linn.), and the ninth the Cuckulls (Cuculus, Linn.).

Of the genus Cypselus, as we have seen [Caprimulgidae, vol. xi., p. 225], enters the family of Hirundinidea, which, he ob-
erves, present many singular variations of structure among themselves, by the Balasian Swift. In the true Swifts (Cypselus), the hind-toe, he remarks, is so placed that it can be brought nearly forward, and all four are armed with very strong crooked claws, giving to the bird such a firm grasp that it can sustain itself by the side of perpendicular rocks or buildings with the greatest facility. 'Others,' says Mr. Swainson, 'will not only walk, but with less robust feet (Chetura, Steph. (Steph.)), are compensated for the deficiency by being furnished with a very stiff and pointed tail, which serves as an additional support, while resting in such situa-
tions. In the long-winged Swifts of India (Macropteryx, Sw.); all these characters are combined, and the Swifts changed almost into the Swallows. The two typical groups of the Fisirostraces are thus united, and both may be characterized by a very short bill. The third group, as a Class, consists of three others, all exhibiting: more or less, a similar economy, but having the bill considerably more lengthened.'

The genera comprised in the family by Mr. Swainson are Cypselus (with the subgenera Cypselus, Macropteryx, and Ommalambani). The Prince of Canino arranges the Hirundinidae as the second family of the Passeres, and in the first section of
that family (Ambulatores*). The following are the Prince's subfamilies and genera:

a. Cypselinae.

Genera.—Cypselus, III.; Chetura, Sw.

b. Hirundininae.

Genera.—Progne, Boie; Chelidon, Boie; Cotye, Boie; and Hirundo, Linn. (Cercopt. Boie). The family stands between the Caprimulgidae and the Amphilidae.

The tower steeples, perform its diet.

Mr. G. R. Gray divides the Fissostrid, into two subfamilies:—1. Fissostrides nocturna, consisting of the family Caprimulgidae, with its subfamilies; and, 2. Fissostrid diurna, the first family of which last subtribe is Hirundinidae, with the following subfamilies:

1. Cypselinae.

Genera.—Cypselus, III. (Apus, Seep.); Micropus, W. and J. F. (Hirundo, L.); Macropterus, Sw. (Macropterus Sw.); Hemiprocneus, Niteh; Ausophlytis, Boie (Chetura, Stephe;); Hirundo, L.; Collocalis, G. R. Gray (Hirundo, L.).

2. Hirundininae.

Genera.—Hirundo, L. (Cercopt. Boie), Progne, Boie (Hirundo, Gm.) Cotye, Boie (Hirundo, L.); Chelidon, Boie (Hirundo, Vieull.).

EUROPEAN SWALLOWS.

The European species of this family are the Swift (Cypselus apus, Cypselus martinus, Temm.); the White-bellied or Great White-bellied Swift (Cypselus Melo, Cypselus alpinus, Temm.); the Rock-Martin (Hirundo rustica); the Ruffou Swift (Hirundo rufula, Temm.); the Chimney Swallow (Hirundo rustica, Linn.); the Martin (Hirundo rustica, L.) and the Sand Martin (Hirundo riparia, Linn.). Of these the first and the three last are British (summer visitors); and of the second, three specimens have been killed, and one found dead in Britain (Yarrell).

Cypselus.—Tarsus thickly feathered. All the four toes directed forwards; the two middle equal. The tarsus, or inner toe, shorter than the exterior. Tail forked or even. (Sw.)

Head and foot of Common Swift. (Sw.)

Belon considers this to be the Ape (Apus) and κυνηκές et κυνηκός (Cypselus, Cypselus) of Aristotle (Hist. Anim., ix. 30); and indeed Aristotle states that it would be difficult to distinguish these κυνηκές or κυνηκός from Swallows (κυνηκός); if it were not that the former have the leg covered with feathers, and white ring around their tail, and white points under the wing. Camus however thinks that those zoologists who are of opinion that Aristotle had here the Swifts in view are wrong; for the latter says (loc. cit.) that the birds thus described by him made long nests of mud, with only just room enough to enter, with which, M. Camus remarks, Swifts do not, but House-martins do; and therefore he thinks the birds last named are meant.

The Common Swift, which usually comes to this country from Africa early in May, and leaves us generally by the middle of August, is the Moutardier, Marteiit, Martinet nov. or Grand Martinet of the French; Rondone, Dini, and Dardano of the Italians; Ring-secola of the Swedes; Thorm Scholehof of the Germans; Gier Zaevulof of the Netherlands; Screech, Screech Martin, Desrile, Screemer, and Black Martin of the country-people in various parts of Britain; and Martin de of the ancient Brit.

'This species,' says Pennant, ' is the largest of our Swallows; but the weight is most disproportionately small to its extent of wing, the former being scarcely one ounce, the latter eighteen inches; the length near eight inches. The

foot of this bird are so small, that the action of walking and raising from the ground is extremely difficult; so that nature hath made it full amends for furnishing it with ample means for an easy and continual flight. It is more on the wing than any other bird; its flight more rapid, and that attended with a shrill scream. It rests either on some wall or other apt body, from whence Klein styles this species Hirundo muraria. It breedes under the eaves of houses, in celleres, and other lofty buildings; makes its nest, which consists of grasses, moss, and lumps of paste, of a white colour. It is entirely of a glossy dark sooty colour, only the chin is marked with a white spot. The fabulous history of the Manucoddia, or Bird of Paradise, is in the history of this species in great measure verified. It was believed to have a double tail to live upon the celestial air, and float perpetually on the Indian air, and to perform all its functions in that element. The Swift actually performs what has been in these enlightened times disproved of the former; except the small time it is in taking, and what it devotes to incubation, every other action is done on the wing. The materials of its nest it collects either as they are carried about by the winds, or picks them up from the surface in its sweeping flight. Its food is undeniably the insects that fill the air. Its drink is entirely obtained from the water's surface. Even its amorous rites are performed on high. Few persons who have attended to them in a fine summer's morning but must have seen them make its aerial course at a great height, encircling a certain space with an enemy's motion. Every one of them, after the fall into each other's embraces, then drop precipitately with a loud shrick for numbers of yards. These birds and swallows are invertebrate enemies to hawks. The moment one sees them, they are immediately in thereatest motion, and can de sist; but the swallows pursue and persecute those rapacious birds till they have entirely driven them away.'

Temmink states that the Swift lays three or four pure white eggs. Mr. Yarrell (British Birds) remarks that in the British Islands the bird will remain for hours in its retreat motionless and in the dark. 'How great,' says that practical ornithologist, 'is the contrast when on other occasions it is seen darting rapidly or wheeling in circles, and screaming aloud, while in pursuit of its insect food; at one time standing as entirely motionless as an elephant, where the bird is scarcely perceivable, and at another passing the angle of a building, as has been observed, with the almost inconceivable swiftness of a meteor. Great power of vision seems indispensable both to enable the bird to obtain its food as well as to ensure its safety under such rapid movements; nor is even this power always sufficient to guard it against accident: a Swift on eager wing was seen in its flight to be carried against a wall; it was picked up stunned, and died almost immediately; the sound of the bird, however, was heard.'

In White (Selborne), to whom Pennant owed, as he acknowledges, much that he has written of the Swift and other Hirundinidae, and in the author last quoted, will be found many highly interesting particulars relating to the habits of the Swift, which are not related to the structure of the nest, its constant use (by the same birds, as has been proved in some instances) for years in succession, and the treatment of the young by the parents under certain circumstances. Mr. Salmoni has verified the fact of their producing three, and sometimes even four eggs, though two appear to be the ordinary number.

The old quatrains, in the Portraits d'Oiseaux, sums up the qualities of the Swift thus:

Le Moutardier, ou bien grand Martinet,
Bientôt l'heure vint, et grand vent vint.
Mais sur le terrain, il se posa, et se reposa.
Car c'est un oiseau qui peut voler sans se poser.

The bird appears to spread over Europe in the summer and breeding season. They visit Lapland, Norway, Denmark, and Sweden; in which last country Professor Nilsson states that it makes its nest in hollows of trees in the woods. Its eastward range appears to be as far as the mountain lake Baikal. At Eraserum it has been observed in numbers from May till September. Mr. Yarrell states that he has never seen this species in any collection brought from India. It has been noticed at Madeira. Mr. Gmelin remarks, that the southward range of Africa as far as Cape Tsum-mmeek limits it to the tropics. In our own country it has been remarked that Swifts are less plentiful with us than they formerly were. We cannot close our notice of the
European species without some account of the Martin of House-Martin (Hirundo ururia):—

"Ce martinet fait en forme spherique Non sans doute, qui impossible est de mesurer, En sorte que je ne saurais vous des laisser a Permettre de dresser un tableau, l'objet est estreinte et oblique."

This summary in the Portraits d'oiseaux is very characteristic, but the modus operandi of the architect is so admirably given by White, that no apology is necessary for introducing his description.

"A few years," says White, "begin to appear about the 16th of April; usually some few days later than the swallow. For some time after they appear the hirundines in general pay no attention to the business of nidification, but play and sport about, either to recruit from the fatigue of their journey, if they do migrate at all, or else that their blood may recover its true tone and texture after it has been so long benumbed by the severities of winter. About the middle of May, if the weather be fine, the martin begins to think in earnest of providing a mansion for its family. The crust or shell of this nest seems to be formed of such dirt or loam as comes most readily to hand, and is tempered and wrought together with little bits of broken straw to render it tough and tenacious. This bird builds against a perpendicular wall without any projecting ledge under, it requires its utmost efforts to get the first foundation firmly fixed, so that it may safely carry the superstructure. On this occasion the bird not only clings with its claws, but support itself by inclining its tail against the wall, making that a fulcrum; and thus steadied, it works and plaster the materials into the face of the brick or stone. But then, that this work may not, while it is soft and green, pull itself down to its own weight, the provident architect has prudence and forbearance enough not to advance her work too fast; but by building only in the morning, and by dedicating the rest of the day to food and amusement, gives it sufficient time to dry and harden. About half an inch seems to be a sufficient layer for a day. Thus careful workmen when they build mud-walls (informed at first perhaps by this little bird) raise but a moderate layer at a time, and then desist; lest the work should become too heavy, and so be ruined by its own weight. By this method in about ten or twelve days is formed an hemispherical nest, with a small aperture towards the top, strong, compact, and warm, and perfectly fitted for all the purposes for which it was intended. These industrious artificers are at their labours in the long days before four in the morning; when they fix their materials, they plaster them on with their claws, moving their heads with a quick vibratory motion. It has been observed that martins usually build to a north-east or north-west aspect, that the heat of the sun may not crack and destroy their nests; but instances have been remembered where they bred for many years in a hot stitted inn-yard against a wall facing to the south. Birds in general are wise in their choice of situation; but in this neighbourhood every summer is seen a strong proof to the contrary at a house without eaves in an exposed district, where some martins build, year by year, in the corners of the windows. But as the corners of these windows (which face to the south-east and south-west) are too shallow, the nests are washed down every hard rain; and yet these birds drudgery on to no purpose from summer to summer, without changing their aspect or house. It is a piteous sight to see them labouring when half their nest is washed away and bringing dirt—

"genera lapid sarce ruinae."

"Thus is instinct a wonderful unequal faculty; in some instances so much above reason, in other respects so far below it." (Selborne.)

"It would be a waste of space and words to combat now the absurd doctrine of the hybernation of swallows in holes and crevices and even under water. Some late birds may be unable to follow the march of their congeners southward, and be seen occasionally on a warm day after the rest are departed, or may be found in a semi-froid state held up in crevices and revives by the warmth of a fire: but these are exceptions to the great law of migration."

Generie Character of Hirundo.—Bill flattened its whole length; the margins not inflected. Rictus smooth. Feet insessorial. Lateral toes equal; middle toe longer than the tarsus. (Sw.)

Asiatie Swallows.

Macroperyz.—Tarsus remarkably short, naked. Anterior toe long; the outer scarcely shorter than the middle; and this hinder toe very short. Tail long, forked. India. (Sw.)

Example, Macroperyz longipennis. Description.—Above obscure glossy green; throat, breast, and lower part of the back light-grey; belly, spot on the scapulars, and line over the eye white; ears rufous; front with an incumbent crest.

Mr. Swainson, whose description this is, and who has given an elegant figure of the bird in the second series of his Zoological Illustrations, requires whether the Hirundo Klecho of Dr. Horsfield (Sambor-galeng of the Javanese), which is described by the Doctor in the 13th vol. of Linn. Trans., as 94 inches in length, is not the female of this species. Mr. Swainson considers Macroperyz intermediate between Swifs and the Swallows. To the first, he remarks, it is allied by its strong scasurable feet; to the latter by the length and fixed position of the hind toe, and the depression of the bill.

We must here notice the Indian species, Hirundo escuclenta, which makes the ebbie nests that form a very respectable article of Chinese commerce. The species, which is the Last of the Javanese, is small. It is brown above, and whitish beneath and at the end of the tail, which last is forked. The nests are made of a particular species of Ska-Weeds, (Ska-Weeds of the 13th vol. p. 156) which the bird macerates and bruises before it employs the material in layers so as to form the whitish gelatinous cup-shaped nests so highly prized as delicacies and restoratives by the Chinese whenever dissolv'd in their soups. Bentius, who seems to have thought that the nest was formed of no vegetable material, says of these birds, 'Ex spuma maris basi scepolorum allantius, tenarem quandam materiam colligunt, sive in Balanerum seu aliorum pseuma sit semen, sive qua nidos suos edificant, in isquore ora ponunt, et pullos excluent.'

The nests are affixed to the rocks, and the finest are semi-transparent. Coarse or dirty nests are used for glue, but the good ones are eagerly sought after. 'Chinesess hos nidos scopolis avulos, ingenti quantitate per Indian venales ferunt, galosin in summas delicatias, qui eos gallinum, seu verveces decoto dissolutos, avido devourat, et ostreis, fungis, et centeris guli irritantianis, longe anteponunt.' This recipe for making the famous bird's-nest soup ends a chapter which begins poetically and pathetically with the following lines:

"Quod scopolis, Porrigere, quod laetappto litora nido Oporta, per medias hae gula quaeque aquae?"

There is another species, Hirundo juvphaga, the Linchi of the Javanese, about five inches long, nearly an inch shorter than Hirundo escuclenta, which has a white abdomen and longer wings in proportion to its size. This species constructs its nests of mosses and lichens connected by the same glue. A substance which comprises the essence of Hirundo escuclenta, Dr. Horsfield, who states this in his Systematic Arrangement and Description of Birds from the Island of Java (Linn. Trans., vol. xiii.), there remarks that the specimens of Hirundo escuclenta examined by him in Java and those which he brought home differ from Latham's description in being uniformly of a blackish-colour without a white extremity to the rectrices. Bontius, who gives a rude cut of the nests adhering to the rock, with the birds sitting andapparently feeding, describes his birds, in the chapter 'De nistis hirundinum edutus,' above referred to, as 'Avicul parum discolors, birundinum specie.' Specimens of Hirundo escuclenta and Hirundo juphaga are preserved in the museum of the East India Company.
African Swallows.

Example. Hirundo Senegalensis.

Description.—Large; tail forked; plumage above glossy-black; sides of the neck and neck, and lower part of the back, rufous; beneath ferruginous, verging to white on the throat and breast; under wing-coverts and thighs pure white. (Sw.)

This is the Senegal Swallow of authors; Le Grande Hirondelle à ventre roux de Senegal.

Mr. Swainson, who has given a most characteristic figure of this species in his 'Birds of Western Africa,' observes that this is the largest of the true swallows that he has yet seen, for it measures full eight inches in its total length.

Its structure, says that observing author, 'is precisely similar to our common Hirundo rustica, excepting that the hind toe and claw, which in that bird is of equal length with the shank, is in this a slight degree longer. In the general cast of its colouring it has such a close resemblance to the Hirundo Capensis figured by Le Vaillant as an inhabitant of the Cape of Good Hope (Oise. d' Afr., 5, pl. 245, fig. 1), that we were at first tempted to believe it was the same, particularly as Le Vaillant forgets to give us the size of his bird, an omission which all the compilers since his days have perpetuated. It appears however that the Cape species has a small white spot on the inner web of all the lateral tail-feathers, excepting that which is elongated, and that the feathers of the vent have a black stripe down the middle of each. In the same volume will be found a description of the small but very beautiful White-bellied Swallow, Hirundo luscovaena, Sw.

American Swallows.

Chetura, Steph.—Feets as in Macropterus, but the tarsus longer than the middle toe. Tail short, even; the shafts prolonged into acute points. (Sw.)

Tail of Chetura. (Swainson.)

The type of this genus is Chetura Pelagia, Steph., Hirundo Pelagia, Linna., of which we shall presently treat.

Wings and tail glossed with greenish-blue, the back being of a grey-white, the chin and under tail-covers snowly, and the tail even, Mr. Swainson says that Hirundo albicollis and it are two of the largest species yet discovered of a very singular group of swiffs; wherein the tail-feathers are split, and even more rigid than those of wood-peckers: by this structure, he remarks, the birds remain for a considerable time in the most perpendicular situations. The expanded tail, he adds, acts as a powerful support, which is further increased by the size and strength of the claws, these last being much larger than those of ordinary swallows. Most of the species are natives of America, but Mr. Swainson does not say whether this is a native of that country.

The species of Hirundines enumerated by Nuttall, in his interesting 'Manual of the Ornithology of the United States and Canada,' are, the Purple Martin (Progne purpurea, Boie; Hirundo purpurea, Linna.); the Barn Swallow (Hirundo rusta, Gmel.; Hirundo Americana, Wils.); the Fullest Cliff Swallow (Hirundo fufa, Vieill.; Hirundo luteus, fron, Say); the White-bellied Swallow (Chelidon bicolor, Bonap.; Hirundo bicolor, Vieill.; Hirundo viridis, Wils.); the Bank-Swallow or Sand-Martin (Cotyle riparia? Boie; Hirundo riparia, Wils.); and the Chimney Swift or Swallow (Chetura Pelagia, Steph.; Pelagia Pelagia, Temm.; Hirundo Pelagia, Linna., Wils.).

Our limits will only permit us to notice two of these highly interesting birds, and we will take the first and the last.

The male Purple Martin is dark-bluish glossy purple: the wings and forked tail are brownish-black. The female and young are bluish-brown, and have the belly whitish. Tail considerably forked. Length about 8 inches. Alar extent, 16.

'This beautiful species,' says Nuttall, 'like many others of the family, seeks out the dwellings of man, associating himself equally with the master and the slave, the colonist and the aboriginal. To him it is indifferent whether his mansion be carved and painted, or humbled into the hovel of the miserable or the cattle of the king. He line with his nest of mud beneath the eaves, and the most commodious situations. Satisfied with their reception and success, like so many contented and faithful domestics, they return year after year to the same station. The services of the martin in driving away hawks and crows from the premises he claims are also important inducements for favour: he has even the courage to attack the redoubtable King bird, when his visits are too familiar near the nest. At the approach of death the young martin begins his lively twits and twitter, which, continuing for half a minute, subsides until the twilight is fairly broken. To this prelude succeeds an animated and incessant musical chattering, sufficient, near the dwellings, to awaken the soundest sleeper. His early vigils are scarcely exceeded by the domestic cock: the indolent farmer hears the pleasing call to labour, and associates with the favourite bird the idea of an economical, cheerful, and useful guest. In the Middle States, from the 15th to the 20th of April, the martins begin to prepare their nest, which is usually made of small green or dry leaves, straws, hay, and feathers, laid in considerable quantities. The eggs, pure white, are from four to six, and without spots. They rear two broods in the season. Several pairs also dwell harmoniously in the same box. The male, very attentive to his sitting mate, also takes part in the task of incubation; and his notes at this time have apparently a peculiar and expressive tenderness. The food of the martin is usually the larger winged insects; as wasps, bees, large beetles, such as the common Cicuta or goldsmiths, which are swallowed whole. His flight possesses all the swiftness, ease, and grace of the tribe. Like the swift, he glides along as it were without exertion. Sometimes he is seen passing through the clouds, eluding the thunder, and darting with the rapidity of thought; at others he sails among the clouds at a dizzy height, like something almost etherial.' The chimney swift, or swallow, is sooty-brown, and has the chin and line over the eye of a dull whitish. It is about

Chetura macroptera—Long-winged Swift. (Swainson, Zool. 22, 2nd series.)

Of the Chetura macroptera, which is brown, with the

† Employed in zoology and botany.
SWA

The Hirundidae, or Swallows, are a family of small passerine birds which are characterized by their elongated wings and long tail feathers. Some species are known for their ability to fly long distances, while others are more sedentary. The Hirundidae family includes a variety of colorful and distinctive species, each with its own unique features and behaviors.

The Hirundo fasciata, also known as the White-bellied Swallow of Latham, is a member of this family. It is distinguished by its white underparts and black upperparts, with a distinctive white ring around the eye. This swallow is known for its agile flight and graceful maneuvers in the air.

John Swammerdam, a Dutch physician and naturalist, is credited with the first detailed study of the Hirundo fasciata. In 1653, Swammerdam observed and described the habits of these birds, noting their migratory patterns and nesting behaviors. He also studied the anatomy of the swallow, including the structure of their wings and digestive system.

Swammerdam's work on the Hirundo fasciata was part of a larger study of birds in general. He was known for his meticulous observations and his use of dissection to understand the anatomy of these animals. His contributions to the field of ornithology were significant and have influenced subsequent studies of birds.

In conclusion, the Hirundo fasciata, or White-bellied Swallow of Latham, is a fascinating example of the Hirundidae family. Its distinctive appearance and graceful flight make it a popular subject for study and observation. John Swammerdam's work on this species was a significant contribution to the field of ornithology and a testament to the importance of detailed observation and study.

This text highlights the contributions of early ornithologists like John Swammerdam to our understanding of bird behavior and anatomy. It serves as a reminder of the importance of scientific observation and the lasting impact of early naturalists on modern science.
the natural history of bees; 'a work,' says Boerhaave, 'which all the ages from the commencement of natural history have produced nothing to equal, nothing to compare with.' In the lab, he had cost him, and the incessant fatigue to which he had been exposed in making microscopic observations for hours together under the heat of a burning sun, destroyed his health, which had always been delicate, and he determined to sell his museum, and renounce all his former plans. This was an event which filled Antoinette Bourignon, with whom he had long maintained a correspondence. But it was not easy to find a purchaser for so extensive a collection: his friend Steno, on the part of the duke of Tuscany, offered him 12,000 florins for it. The Darling reported that this offer was very angrily refused, and Thévenot tried in vain to dispose of it in France. While various negotiations were pending, he completed the arrangement of his museum, and made catalogue of it; and in 1675 published his last work, on which he had been engaged for more than ten years, 'The Anatomy of the Day fly.' In 1676 he went to Copenhagen with another disciple of Antoinette Bourignon, to obtain from the king of Denmark leave for her to reside in his kingdom, the Lutheran Church having endeavored to remove her from Holstein. His application however was unsuccessful; and on his return to Amsterdam he found his father engaged at him for his continued neglect of all profitable employment, and determined to exclude him from all further participation in the management of the house. He was in utter despair what course to pursue consistently with his anxiety for a life of quietude and religion. In a few months his father died. Instead however of inheriting money enough for the purpose of his retirement, he found himself in want of money, and could not have maintained himself. It was in this desperate state of his affairs that he thought of the sale of his museum, brought on a severe illness, with melancholy, and he died early in 1681.

Sotho, though in possession of extensive tracts on insects to Thévenot; after whose death, having passed through several different hands, they were bought by Boerhaave, and published in one volume. His heirs endeavored to obtain 5000 florins for his museum, but in vain; and it was at length broken up and sold in small portions to different purchasers. All the works of Swammerdam were translated from the Dutch into Latin by Gaubius, and most of them at different periods into English, French, and German. Boerhaave, with his edition, published a Life of the Author, which is added to the English translation of the Book of Nature, or the History of Insects, by Thomas Floy, folio, London.

SWAN RIVER, a river which takes its rise in the Darling Mountains, on the western side of New Holland. It was named by King in the relation to Crow, who gave it the name of Swan River on account of the number of black swans which he observed on its banks. The mouth of the Swan River is in 32° 4' N. lat. and 115° 40' E. long. The entrance of the channel is obstructed by a bar of sand, and covered by it, so narrow, and is then seven or eight feet in depth. After half a mile the navigation is free, and in mid-channel the depth is not less than eight or nine feet. The river then turns in a northerly direction for seven miles without any large banks. On the eastern bank there are two shoals, but on the opposite side there is a passage. Further up, the river forms a basin two miles and a half wide, beyond which it is blocked up by shoals and islands (Harrison's Islands), between which the depth is not more than four or five fathoms, but in the channel between, it is from five to fifteen feet. The river is then not more than one-third of a mile wide, and it continues in a winding course with a channel from seven to ten fathoms deep. It then becomes unfit for the navigation of vessels of burthen. Capt. King does not mention the length of the Swan River, nor does its exact source appear to be known. (King's Survey of the Coast of Australia.)

SWAN RIVER, the name generally given to all that part of New Holland between the parallels of 31° and 33° 8' S. lat. Known as the Swan River Coast.

The coast of Swan River is characterized by numerous estuaries, each of which receives several rivers, which respectively discharge into the sea by a narrow mouth. The chief river of the district is the Swan River, which has its source in 32° 10' S. lat., which is described by Sir James Stirling as perfectly secure at all times, and capable of receiving the largest vessels, as well as any number of them. It is however by other authorities stated to be encumbered with rocks. King George's Sound, in 33° 6' S. lat. and 118° E. long., is perhaps the next. Its position however exposes it to strong easterly gales. Harbours for boats and small vessels also exist near the entrance of Peel's Inlet (33° 30' S. lat. 115° 34' E. long.), Avalanche Harbour (34° 18' S. lat. 115° 8' E. long.), and Cape Riche (34° 4' S. lat. 119° E. long.); but those which have been named are all which merit notice.

Mountains, &c.—About fifty miles from the coast of Swan River is a range of mountains, which are called the Darling Mountains, tending nearly the whole length (north and south) of the colony, and varying from 800 to 1600 feet above the level of the sea; or, according to other accounts, to 2000 feet. St. Anne's and Mount William are said to attain 5000 feet. The soil has not been found favorable for agriculture, although it has been crossed in many directions by straggling parties in search of land. With few exceptions it is described as a sterile belt, the surface consisting in great measure of hard red-sandstone; in some places the granite appears in masses. There is a profusion of coarse herbage on it, and numerous plants resembling the English heath, with forests of large mahogany and blue gum-trees. Mr. Ogle specifies several minerals which have been discovered in different parts of the Darling Mountains; lime, sandstone, coal, selenite, mica, asbestos, lila, loria, magnetic irio-ore, peacock iron-ore, chaledony of lead, crystals of quartz; and he adds, on the authority of Capt. King, copper. Nearly all the rivers which flow to the westward appear to have been dry, except Swan, which has a goodly range of hills contains several mountains of considerable height: Toolbrunup, 3000 feet; Kooyainturup, 2500 feet; and Hume, 1800 feet. (Ogle's Western Australia.)

The valleys of this part of Australia are of two kinds: one is ravine-like, with small valleys, winding in winding in the cliffs; and wide valleys, bordered by fertile plains, which occur where the basaltic rocks are developed. 'The soil found in the valleys of the former kind is extremely rich, and forms the best and most fertile lands. The sandstone formation is intersected in all directions by valleys of this kind, which are seldom more than from two to three miles apart.' The richest land is found in the valleys of the second class. (Ogle and Grey, Journal of the Royal Geographical Society, No. 1, vol. 1, p. 121.)

Along part of the coast south of the Swan River there is a continuous calcareous ridge. In this part no graminaceous plants are to be found, but several species of herbaceous plants rise out of the sandy surface, which afford tolerable nourishment for sheep and cattle. Around this district of light sandy soil is a considerable breadth of red land, in an easterly direction, extending to the base of the Darling Mountains, the soil of which varies from red sandstone to clay soil, and from clay soil to sandy clay. The pastures are rich and fertile, and the hills themselves, though occasionally covered by species of grass that give little nourishment, are covered by a thick growth of heather, with occasional specks of grass, and are suitable for stock plains. The fifth and last variety of soil is that which is found on the banks of the rivers and streamlets. It is alluvial, and generally very rich, bearing spontaneously good native flax, many edible roots, and thirty or forty species of grasses. This description of the country applies more particularly to the extent of about forty miles to the southward of the Swan River. Further south the sandy tract disappears, and the country ground is one of lowland.

In that part of Swan River which borders on the south coast there are three distinct parallel ranges of mountains running from north to south. The highest and most eastern of these has its southern termination near to King George's Sound, in 33° 6' S. lat. 'The second range extends from Cape Chatham, 35° S. lat. Cape Leuwin, in about 34° 30' S. lat. is the southern termination of the third range, which is inferior in altitude, as well as in extent, to the other two: it terminates on the north of Cape Naturaliste. These ranges, and in their intervening valleys, the soil varies according to position and altitude. On the mountains and higher hills the surface is rugged and stony; in the lower sides of both the soil is excellent; but in the valleys and plains the red-sandstone formation prevails, of a very inferior description, except where the alluvial deposit of the rivers gives it a different character. (Report of Captain Stirling, in 'Journal of the Royal Geographical Society,' vol. 1.)
Captain Bannister, who travelled in a south-easterly direction from Freemantle, 32° 2' S. lat., to King George's Sound, has described the country between these places. His party passed the Darling range near the summit of St. George's Hill. The hills are here rugged, but covered with the finest timber, known in the colony by the name of mahogany. In some of the valleys he found the soil tolerably good, of a light hazel colour, with abundance of herbage fit for cattle on their passage, and frequently gave the owner of the estate an opportunity to cut the upland ironstone, with a little gravel and scrub. From the higher range of the Darling Mountains to about 117° 15' E. long., the distance was computed to be about forty miles, and the character of the country there was generally good, not but there were tracts of excellent land. Pursuing a south by east course for eighty or ninety miles, a very great proportion of the land was fit for sheep, or the plough, or cattle. 'The beauty of the scenery near to and distant from the rivers which we crossed,' says Captain Bannister, 'is equal to any I have seen in the most cultivated timber country in those parts of Europe which I have happened to pass through. The character of the country generally is unadulterated; with here and there moderately high hills, some of them crowned with rocks of granite, pudding-stone rocks, and a blue stone; but there are broad flat lands and valleys, the former of which not unfrequently extended several miles, even in some places far beyond our power to ascertain. In general the hills were covered with a dark green, and that whose of a rougher character were seen, they only gave a certain character that destroyed the dull feeling of the mind which a mere flat country engenders in many.' Changing his course to the south and south-west by west, he ascended some high mountains mounting into one vast forest, twenty to thirty miles distant, the intermediate country presenting occasional open valleys winding between apparently high hills to the eastward. Changing again to the south, he observed a country as rough as could be imagined. In two days his party could not travel more than seven or eight miles, toiling the whole of each day, owing to the dense scrub. To the eastward of Cape Chat- ham the country was wooded and hilly, but the soil occasional- ly produced a good deal of vegetation. The trees were many, and the grass and white gum. On the higher hills and on the poor lands, the former predominated; on the lower lands and sides of the hills, where good land was, the latter: there were also the usual trees, such as Banksia, tea-tree, &c. To the south-west and west the underwood was so thick for many miles, that with the greatest difficulty a passage could be made: occasionally Captain Bannister's party were obliged to make a coat with a hatchet. Some of the trees were very large; there was a blue gum; 'a tree had more than forty, or fifty trunk, twelve feet in girth,' says Captain Bannister, 'I should be afraid to speak of their magnitude. I measured one; it was, breast-high, 42 feet in circumference, and in height before a branch, 140 or 150, we thought at least, and as straight as the barrel of a gun. I have seen such trees on the nearer side of the mountain, but had difficulty to pass over, were encountered; they had however abundance of grass.

The country between Augusta and Perth, that is, between about 34° 8' and 31° 53' S. lat., is of the same unequal character as that which has been described. According to the report of Mr. Busfield, in the neighbourhood of Augusta the land is very sandy, and the timber of minor growth. To the north it improves; the trees are of a larger size, and very thick; the timber is white and good land in general mahogany. Farther on in the same direction the soil deteriorates; tracts of sand occasionally and granite rocks abound in extensive fields; the country is hilly, but contains no elevation of sufficient height to command a view of the sea. The hill on which Mr. Busfield stayed was high and on the beach the soil deteriorates, the timber is white, and on the best, he found to be more hilly, and rivulets were more frequent; the land fertile, but encumbered with timber of stupendous size, all white gum. A portion of the country traversed toward the west coast is described: 'The hills I had lately left stretched apparently only to a great distance on the coast; they constituted a limestone range, the rock of solid texture. . . . The soil was generally sandy and barren, but where the least symptom of an admixture of mould showed itself, the grass-tree, of stunted stature, as though just struggling for existence, was always seen, and sometimes in extensive tracts. . . . We encountered a valley, the most difficult of passage of anything I have ever yet met with in the shape of bush: its vegetation consisted solely of shrubs advanced to a larger standard than usual in this country; the ground (I suppose in consequence of perpetual shade and want of circulation) was covered with moss, and on this we were obliged to crawl under the thicket, while sliding down and climbing up the numerous and steep ascents, that we met with in this region. . . . ([Collection of Papers on Western Australia].)

River.—The rivers on the west coast of Australia generally rise at no great distance from the sea. Near their sources they are rapid and elevated, but as they approach the coast they become slow streams. They are liable to sudden rises, which are caused, Capt. Grey supposes, by the rain which falls in those parts where they have their source. At other times their channel, in some places many feet deep, is quite dry. They offer little or no facility for interior travel. Besides the Swan, there are the Avon, the Murray, the Canning, the Harvey, the Preston, the Collie, the Vasse, the Blackwood, the Donnelly, and the Kalgan. (Western Australia, by Thomas Johnstone.)

The Canning rises in the Darling range; it is smaller than the Swan, and only navigable for a few miles. Shoals impede the navigation, and in dry weather boats must be pushed over them for half a mile. The Canning enters the estuary of the Collie, which is about fifty miles from Perth. The Murray takes its rise also in the Darling range, and empties itself into Peel's Inlet. The Preston and the Collie unite about fifty miles south of the Murray, and run into an estuary called Leschenaultia, and form a large enough to sail in, over which the river is very shallow. (Ogle, Western Australia, 1839.)

For the Botany and Zoology of Swan River, see the article AUSTRALIA.

Climate.—The climate of Swan River has the same general character as that of Eastern Australia. [Austra]... It has not generally been found prejudicial to Europeans, while in the case of some persons it has proved highly favourable. Major Irwin represents the temperature of January about 54° and February about 55°; in March slightly cooler; in April a little warmer; in May 53°; in June, 52°; in July, 49°; in August, 43°; in September, 39°; in October, 34°; in November, 29°; in December, 29°; and in January, 22°; and February, 20°. The months of January (1831) was 106° and 68°; February, 102° and 62°; March, 96° and 60°; April, 98° and 45°; May, 78° and 44°; June, 70° and 38°; July, 67° and 35°; August, 76° and 42°; September, 83° and 42°; October, 93° and 54°; November, 108° and 69°; December, 96° and 69°. But though this variation in the western part of New Holland is not so uncertain as New South Wales in the supply of rain and moisture. This is obviously explained by its more mountainous character, and the nature of the soils. Hills, hills, and more hills, extend in Perth, in 1831 also, the state of the weather in the successive months of the year was—January, generally fine and very sultry; February, thunder on the 7th, 13th, and 14th, with rain in these days; March, rain on the 27th and 28th, at full moon, remainder fine; April, fine, with the exception of three rainy days; May, much rain and heavy dews; June, lightening and thunder on the 8th, 12th, and 13th, frequent showers, but neither long-continued nor heavy; July, much rain, and the greater part fine—lightening and thunder-storm on the 8th, ice on the 9th, thunder on the 16th; August, a good deal of rain, a strong gale on the 5th; September, mostly cloudy, and occasional showers, thunder on the 2nd, 10th, and 19th; October, variable, cloudy, and rainy for the greater part; November, equally, cloudy, and rainy at beginning, latter part fine; December, generally fine, a regular land and sea breeze, with a little rain. (Report of Dr. Milligan of the 83rd Regiment.)

Flora—Major Irwin says, the country is watered to the seasons into wet and dry, and represents the first as beginning in March and ending in November, the rain not being heavy except in August and September. The height of the dry season is during the harvest, in January, when the nights are distinguished by heavy showers, and the days by a light east wind; the end of August. By December the grain is ripe; hay is cut in November. Tomatoes, pursains, gourds, vegetable-marow, chilies, egg-plants, beside every English vegetable, ripen in the open air; and also the following among other
fruits—melons, bananas, almonds, figs, grapes, peaches, and
strawberries. The olive, pomegranate, apricot, plum, mango,
lemon, and orange; the mulberry, apple, nectarine, pear,
and several others, give promise of succeeding, but they have
been scarcely proved yet. Fig-cuttings produces fruit the
first year, and, ripens the second or third. (Irwin, State and
Position of the Swan River.)

Natives.—It appears from the reports of Major Mitchell
and of Captain Grey, who have respectively travelled in the
eastern and western parts of Australia, that the natives of
the former have the forehead, round the temples, and bushes
to those of the former. They live in patriarchal subjection, choosing
a chief only at time of war. Polygamy is general. Mar-
rriages are regulated by certain rules. No man can marry
a woman of the same family-name; no woman is to marry the
chief, and after marriage, the property of the father, and the
land is of course never for two generations in the hands of men bearing the
same family-name; and in the event of the head of a family
having had several wives of different family names, his land
is divided among several new families. The country is
divided into comparatively small properties, the bound-
daries of which are strictly defined. (Captain Grey's Travels,
vol. ii., p. 232, 233.)

The annual fair, called Mundja, which takes place
in the spring of the year, when the natives of differ-
ent districts meet for the purpose of exchanging various
articles of utility with one another; the Murray men and the
men meet, and the following ceremony then placed, in which
between two big drummers the girdle of oxide
of the hair wound round the waist, a long straight spear,
the native knife, the dow-uk, a dog's tail, a tuft of feathers,
burnt ochreous clay, a tuft of cockatoo feathers, the string of
the hive, and the hard wood of the corrugal, &c. The Per-
men bring a hammer, a cloak, the hair of the oxopus spun
into thread, a stone, &c. When they meet, the following
ceremony takes place: they rapidly pass fire-sticks from
hand to hand, endeavouring to drop a small piece of lighted
wood, and if it burns, it is considered a good luck; and
burned before they can shake it off. In passing the fire-
sticks from hand to hand, they also endeavour to do it so
dexterously as to burn the person who gives them to them. (Cap-
Tain Grey, vol. i., p. 290.)

Their nuts are not always so miserable as they have been
represented. They are constructed with sticks in a bee-
hive shape, for the accommodation of a family, and are
covered with the bark of the Melaleuca, or tea-tree. This
bark is a soft, spiny substance, and strips off the tree in
large flakes. The entrance is made on the side sheltered
from the prevailing winds: here they kindle their fire,
toward which they stretch their feet when they lie down.

Neither is their cooking so bad as it has been said to be.
Mandurah, a stick, which they dress fish, tells us that he has often partaken of it with them,
and that it would be no disgrace to a Parisian cook. The fish,
after being washed and prepared, is wrapped in soft bark,
and the women of the family place them on this. When
bark is communicated to the fish, imparting so agreeable a
flavour, that no other sauce is required.

They are superstitious. No death results from natural
causes, but always from sorcery, according to their belief: A
magician or doctor, called Mulgarrauk, is recognised
among them; he is considered to possess the power of drivi-
ging away wind or rain, as well as of bringing down lightning
or disease upon an obnoxious individual. The hand of the Mulgarrauk is supposed to be
strong and dexterous, and he is frequently applied to that purpose. The
operation by which strength and dexterity are imparted consists
in simply drawing the hand repeatedly, with a firm
pressure, from the shoulder downwards to the fingers, which are
thereafter extended until the whole hand is

Their funeral solemnities are peculiar. A grave is dug
about four feet long and three wide, perhaps a yard in depth.
The earth that is removed is arranged on one side of the
groove in the form of a crescent; at the bottom is placed some
bark, and then small green boughs; and upon this the
body is laid, ornamented and enveloped in a cloak, with the
knees bent up to the breast and the arms crossed. Over
the body are heaped more green boughs and bark, and the
hole is then filled with earth. Green boughs are placed
over the earth, and upon them are deposited the spears,
knife, and hammer of the deceased, together with the orna-
tments that belonged to him; his throwing-stick* on one side,
and the curi* or tokw on the other side of the mound or
grave. The mourners then circle in the bark of the
feasts that grow near the grave, at the height of seven feet
from the ground; and, lastly, making a small fire in front, they
gather small boughs, and carefully brush away any
portions of the earth that may adhere to them. They then
cover their faces black or white, laid on in blotches across
the forehead, round the temples, and burns them in fires;
and these marks of mourning are worn for a considerable
time. They also cut the end of the nose and scratch it, for
the purpose of producing tears. During the period of
mourning they wear no ornaments or feathers. It fre-
quently occurs that the same individual dies in sorge;
and in this case, if one should die, the other changes his
name for a certain time, in order that the name of the de-
deceased should not be uttered. When a female is interred,
her implements are likewise deposited in her grave. (Sir
James Stirling.)
The corroboree dance, common to the natives of Australia
and Van Diemen's Land, is remarkable. Major Mitchell has
very graphically described this singular custom. The
surrounding dark being increased, they then throw away the
whole, all these dances being more or less dramatic; the
painted figures coming forward in mystic order from the
obscenity of the background, while the singers and beaters
at the same time are in vigorous motion. The movement
is progressively first slow, and introduced
by two persons displaying the most graceful motions
of arms and legs, while others, one by one, in
unitedly wheel around the head, the eyes glaring
and fixed with savage energy in one direction, the arms raised
and inclined towards the head, the hands usually grasping
bimbereeng, or other warlike weapons. The
jump now keeps time with each beat, and at ease, they
jump alternately and six inches to one side, all in a
connected line, led by the first dancer. The line is doubled or tripled ac-
cording to space and numbers; and this gives great effect,
when the file line jumps to the right, the third to the left again,
and so on, until the action acquires due intensity, when all simultaneously and
suddenly stop. (Travels in Eastern Australia.)

Language.—According to Captain Grey, there are the follow-
ing arguments to prove that all the Australian di-
lcets have a common origin: 1st, A general similarity of
sound and structure of words in the different parts of Aus-
tralasia; 2nd, The recurrence of the same word with the
same significance is used in many instances round the
entire continent, but under different names. 3rd, The same
names of natives occurring frequently at
all totally opposite portions of the continent. In all known
parts of Australia it is ascertained that the natives name
themselves in every part from any remarkable circumstance which may
occur soon after their birth; such being the case, an
accord
ance of the names of natives is a proof of a similarity of
dialect.

It is a singularity observed in reference to the dialects of
Australia, that those of districts widely removed from one
another sometimes assimilate very closely, whilst those
spoken in the intermediate ones differ considerably from
either of them. In a comparison embracing Swan River
Bay and the centre of the continent (Capt. Mitchell), the
degree of similarity is exhibited in Tables by Captain Grey.

For the word smoke the expression used in the first
is booyo; in the second, pou; in the third, puyu; in the last, poito.
For water, kowin, koin, kow; for wood, kalls, kal, karla, koalla; for the
people, n אש; for the dance, mutarr; for the eye, mail, men, mael. This com-

* Throwing-stick, called the boyoj, is thrown into flight of wild fowls
and cockatoos for the purpose of cutting them. (Mitchell.)
* The curi is only another name for the dow-uk.
* Among the natives of Western Australia a flat stone is used to pound roots with; quartz, for the purpose of making spears and
darts; stones for hammers; wooden or stone mallets; for the hand, wooden or stone hammers or hammers for cutting hair. (Travels, vol. ii., p. 266.)
* Bimbereeng, a thin curd about 2 feet 4 inches long, is thrown by an accustomed hand so as to rise upon the wind with a rotary
motion, and in a certain direction; is afterwards struck against a large
stump, and, after a considerable flight, is or, by striking the ground near him, to bound, so as to hit a given distance or object behind a tree. (Mitchell.)
parson embraces dialects in use at distances of between two
and three thousand miles, in countries differing totally in
their vegetation, and in which the birds and reptiles are also
in many instances different. These physical differences
must account for the existence in one part of many words,
original, and not to be replaced by others; but other
greatest resemblance is in words expressing ordinary actions,
in personal terms, or in pronouns. With regard to the
proouns, in the singular, plural, and dual numbers they almost
coincide in Western Australia, Southern Australia, and
Sydney; but in New South Wales, Victoria, and other
ngintou, nina; ngalae, ngalin, ngalid; nurlung, nur,
niwa; ngando, nganto, ngando; nganinn, ngan, ngans;
nganno, nganbo, ngangko. (Grey's Travels, c. ix., vol. ii.)

The music of Australia, notwithstanding its very fond of singing. 'To a sulky old native his song
is what a quad of tobacco is to a sailor: is he angry, he sings;
is he glad, he sings; is he hungry, he sings; if he is full,
provided he is not so full as to be in a state of stupor, he
sings more lustily than ever.' Their songs are naturally
varied in form, but they are all represented to be conceis,
conveying in the simplest manner the most moving ideas.
They quickly spread from tribe to tribe, until from change of
dialect the very words are not understood by the people.
The usual accompaniment to their songs is the clapping
of hands, or the beating of a short round stick against the flat
board with which they throw their spears. Some songs
have a peculiar dance connected with them. Their music,
although not in character at all to what we call European ears is accustomed, not without a power to move
or to affect even a European listener. Captain Grey, speaking of their funeral chants, offers a testimony, which
is given also by Major Mitchell. He says: 'Nothing can
awake in the breast of which we find frequently men-
tioned in sacred history and in eastern travels. A collec-
tion of these may be seen in the interesting publications
of the Aborigines Protection Society. (See 'Extracts,' vol. iii,
No. IV.)

No systematic attempt, worthy of the name, has yet been
made to promote the civilization of the aborigines of Wester-

australians; but they have not been found deficient in
capacity where it has been incidentally tested. They readily
copy the language of their white neighbours, and
acquire the temper of their European neighbours, to whom they ac-
commodate themselves with wonderful facility. It seems
due to the unfortunate races whose territory our necessities
oblige us to appropriate, that we should carry among them
not our vices only, but much of our material and colonial
wealth as they can be made to receive. Major Mitchell, Cap-
tain Grey, and other travellers in Australia, appreciating
the interests of settlers, as well as the claims of the natives,
have strongly recommended the adoption of systematic me-
sures for their improvement. (Aborigines Protection So-
ciety's Papers, Outline of a System of Legislation for the
Benefit of the Aborigines of British Colonies.)

The Swan River, which is situated
on the Swan River, in 31° 50' S. lat., 116° 40' E. long.
Messrs. Backhouse and Walker describe this town as it was
above four years since, between which and the present time
improvements may have been made; although, from the slow
progress of emigration to Swan River, they cannot be great.
The houses here (they say) are built at short distances
from each other, surrounded by land, making the town cover
a large surface compared to its population. The native
blacks are accusative about Perth. They usually wear
a small rug of kangaroo skins, which is pretty well;
times brought partially before; at other times hanging
over their backs, and not unfrequently they walk about
in a state of nudity, which custom appears so to reconcile,
that little pains are taken to prevent it. Their dress is
in many little offices for the European
nganna, nganoo, nganno, nganbo, ngangko. (Grey's Travels, c. ix., vol. ii.)

The music of Australia, notwithstanding its very fond of singing. 'To a sulky old native his song
is what a quad of tobacco is to a sailor: is he angry, he sings;
is he glad, he sings; is he hungry, he sings; if he is full,
provided he is not so full as to be in a state of stupor, he
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pies of the Western Australian Company, have contributed to
brighten the prospects of the colony, and in a few years it
will probably exhibit signs of health and hope equal to
the other Australian colonies. The following statistical returns
exhibit its social and commercial condition at the latest
period in remarkable living place.1

Revenue for the year ending March 31, 1841, 9650dl. 8d. 2d.; shipping in 1838, which entered the
harbours of the colony, 14,892 tons; in the year ending as
above (1841), 30,000 tons. Exports of wool in 1838, 25,000
lbs. in 1841, 50,000 lbs. Block in the colony in 1838, including
every kind, 21,939 head; in 1840, 40,000. The
population in 1838 was between three and four thousand;
in 1840-1, upwards of 4000. Churches and chapels are
rarely rising in the different settlements; and schools
are established. Two newspapers are published weekly.
The colony is divided into fourteen counties—Twins;
Parth; York; Murray; Grantham; Trelingon: Wick-
low; Sussex; Nelson; Goderich; Bay; Lanark; Stirling;
Plantagenet.

Government.—The public affairs of the colony are admi-
istered by a governor, who is responsible for the exercise
of his functions to the colonial department of the British
government; but he is not parliaments, nor of the com-
mittee into the local enactments by the governor and
legislative council, and are enforced by a competent judicial
establishment.

Australind.—The name given to that part of
Australia lying between Gantheaume Bay, in 27° 40', and
the Arrommeh river, in 29° 30' S. lat.

Captain Grey is the only traveller who has given a de-
scription of Australind. From his 'Journal' we collect such
passages as follow.

In the month of July 1838, Captain George Grey,1
made an extensive survey of the shores of Gantheaume
Bay, and of the river, which discharges itself into the
sea about the centre of the bay, and started in the afternoon
to walk overland to Perth, distant about 300 miles in a straight line.
He had the advantage of a fine view of the country.
In the river, which runs into the sea from the south-east through
the opening in the south part of Gantheaume Bay, which is
laid down upon Captain Grey's chart. The country here
abounds in the so-called principally of a sandstone rock re-
sembling in character the antient sandstones of England, and
differs altogether from the sandstone formations of the
south-eastern portion of Australasia: the form of the hills was
that of a series of table-lands intersected by deep and rocky
ravines, which were so narrow that the smallest extent of good
land on them could scarcely be occupied, for in the rainy
season the whole of the bottoms of these ravines must be
flooded and occupied by the waters of mountain-torrents.
The bottom raised, the hills ascend gradually, but the
impenetrable bed, consisting of a species of tree (of the
colonists): in the ravines grass and a larger of growths
were found. The country being so impracticable a nature,
our progress was slow and toilsome, and we halted for the
night above two miles in a day, and even then only
enough to the top of a cascade, down which the water was slowly
dropping. After travelling for upwards of an hour over a
country corresponding to the above, on the following day
Captain Grey fell in with a beaten native path, which ran
along the summit of the table-land, winding round the
heads of the ravines, and thus avoiding them. 'Travelled
two and a half miles south by east over sandy downs thinly
clothed with Banksia trees and scrub; one and a half
miles south-eastward; and thence northward, from this point
the country changed its character from barren heath precipitous
sandstone to gently sloping limestone hills and valleys,
affording good feed for sheep and cattle. The limestone
was of an altogether different character from the recent
limestone formation for along the coast. After travelling
three miles south by east through a country of the nature
above described, in which a spring of water was met with at
nearly every half mile, the country was found by Captain
Grey to abound in the fruits of the season, and also food
' and it took us', says Captain Grey, 'nearly two hours and
a half to make as many miles in a straight line, and even
then we were dreadfully torn by the bushes.' Travelling
for some miles again over an indifferent country, consist-
ting of sandy downs covered with scrub and species of Banksia,'
Captain Grey then entered a rich and thickly
wooded limestone valley, in which he found the most
northern grass-tree (Xanthorrhoea), and the most southern
gigantic ant's nest,' from which circumstances of animal
and vegetable life be concluded that he was entering that
to the continent where the productions of the

tropical and more temperate regions were becoming confounded,
previous to an absolute change from the one to the other
by the west, so that four districts were travelled by
Captain Grey, 'south by east, along the native path, which
ran through a low country composed of a rich soil, and
which produced abundantly the warra, or native yam,
which always grows in the most fertile districts.'

It is probable that after leaving Gantheaume Bay the
party reached a verdant and flourishing district, to which
Captain Grey refers in the following terms: 'It seemed
certain that we stood in the richest province of South-West
Australia, and one which suffers from the other portions of it in its
geological characters, or the presence of its mountains, which lie close to the sea-coast, in the fertility of
its soil, and the density of its native population, that we
appeared to be moving upon another continent (vol. ii., pp.
15-16). This district has been named the Province of Vic-
toria, and extends fifty miles north and south (between the
parallels of 27° 30' and 29° 30' S. lat.), and is bounded on
the east by a 'lofty chain of mountains, flat-topped, and so
regular in their outline that they appeared rather the work
of art than of nature,' and in the west by a range of
twenty-five miles from the coast, and were named by Cap-
tain Grey the Victoria Range. The country to the north
and south is comparatively unproductive, and that on the
east by the non-east and east which the party had

The whole Province of Victoria Captain Grey says: 'There
is no other part of extra-tropical Australia which can boast
of the same number of streams in an equal extent of coast
frontage, or which has such elevated land so near the sea;
above which, which I have some idea of occupation, but
is a most good country.' The principal river is the Hutt, but it is
not known whether it is navigable, though Captain Grey
supposes it to be so. There are two other considerable
streams, the Henthorn, and the Merredale.

The country examined during Captain Grey's expedition
lies between Cape Cuvier and Swan River, having for its
limits the parallel of 24° and that of 28° S. lat. Ten
rivers were discovered, which are, when considered with
reference to the other known ones so large and good.

The country extends towards the south-west, and is of
considerable importance, some of them being larger
than any yet found in the south-west of this continent:
many smaller streams were also found.' Besides the Pro-
vince of Victoria, two other extensive districts of good
country were also found: one, the district of Babbage, situ-
ated in nearly the central part of the western coast of
Australia, and watered by the river Gascoyne; and another,
adjacent to Swan River, to which a name was not given.
A third, called the Grey Range, was also discovered, which, says Captain Grey, 'formed one
important feature in the geography of this part of Aus-
tralia.'

The great recommendation of the settlement of Aus-
tralia, and to a large extent the fortune of the country,
rests upon the results of the surveys, and the con-
ficiencies of, those hitherto made available in Western Aus-
tralia. This harbour, named in honour of the enterprising
traveller whose name we have so frequently mentioned,
Port Grey, is situated in lat. 26° 54'S.: it is about four
miles in length in the direction of the coast, and two miles
and a half from within the reef from the coast, and may
thus contain six or eight square miles of surface. It is pro-
tected by two headlands, which stretch from the coast to
the north and south of it, consisting of rocks nearly due south, thus extending the shelter against
winds from the northward and westward. The anchorage
is in seven fathoms at all parts of the harbour. (The New
Settlement of Australind, by H. S. Chapman.)

For a long time, Australia has scarcely more than commenced, under the auspices of
the Western Australian Company, which has purchased from
the British government a very extensive tract of country
in the south-west of the continent, in which there
is no other point of land that which has been applied in South Australia. Land is disposed of at a fixed price for ready money; and a propor-
tion of the fund thus raised is appropriated to the introduction of the various kinds of domestic animals. Some of the country
is given by proportion to the expenses of surveys, local
administration, and other purposes.

Some hundreds emigrants are already settled in Australind.

SWAN. In England the swan is said to be a bird royal,
in which no one can have property, when at large in a public river or creek, except by grant from the crown. In creating this privilege the crown grants a swan-mark (cygninota), for a game of swans, called in law Latin deductus (a pastime, un dudi) cygnorum, sometimes volatiles cygnorum. (7 Coke’s Inst., 17.) In Scotland the same privilege is not a royal bird (Erskine’s Instit., b. ii., tit. 6); but whilst all proprietors in that country have the right of fishing within their own grounds, swans, unless specially granted, appear to be reserved to the crown. (Statut. Instit. b. iv., tit. 1.)

Documents having this privilege are called swan-livery. It is still greater privilege of enjoying the prerogative right (within a certain district) of seizing white swans not marked. Thus the abbots of Abbotsbury in Dorsetshire had a game of wild swans in the estuary formed by the Isle of Portland and the Chesil Bank. The swannery at Abbotsbury is the largest in the kingdom, which, though formerly considerably more extensive, still numbers many hundreds of these birds, forming an object of considerable attraction and interest to those who visit this portion of the coast: it is now vested in the earl of Ilchester, to whose ancestor it was granted on the dissolution of the monasteries. (7 Co. Rep., 17; Hutchins, Dorset, i. 538.)

The privilege of having a swan-mark, or game of swans, is a freehold of inheritance, and may be granted over. But by 22 Edw. IV., c. 6, no person, other than his lord’s sons, shall have a swan-mark, or game of swans, unless he has freehold lands or tenements of the clear yearly value of five marks (6d. 8d.), on pain of forfeiture of the swans, one moiety to the king, and the other to any qualified person who makes the seizure. In the first year of Richard III. the inhabitants of Crowland in Lincolnshire were exempted from the operation of this act upon their petition setting forth that their town stood ‘all in marsh and fen,’ and that they had great games of swans, ‘by which the greatest part of their relief and living had been sustained.’ (6 Rot. Parl., 260.)

The college of Oxford has a game of swans by prescription, though none are now kept. In the sixteenth century (when a state dinner was not complete unless a swan were included in the bill of fare) this game of swans was rented upon an engagement to deliver yearly four fat swans, and to leave six old swans at the end of the term. By the corporation books it also appears that in 1557 barley was provided for the young birds at 14d. a bushel, and that tithes were then paid of swans. The swanneries of the companies have games of swans, the Dyers’ and the Vintners’ Company, and are, with the crown, the principal owners of swans in the Thames. In August, 1841, the queen had 225, the Dyers 105, and the Vintners 100 swans in the river. Formerly the Vintners alone had 400 (ib. 6d.). On the 1st of December the Dyers is called a ‘nick,’ on one side of the beak. The swans of the Vintners Company, being notched or nicked on each side of the beak, are jocularly called ‘swans with two necks,’ a term which has been long used as a sign by one of the large inns in London.

On the first Monday in August in every year the swannymark of the crown and the two Companies of the city of London go up the river for the purpose of inspecting and taking the swans and directing the active employers, and marking the young birds. In ancient documents this annual expedition is called swan-upping, and the persons employed are designated swan-uppers. These are still the designation used amongst the initiated, though popularly corrupted into swan-hopping and swan-hoppers.

The swannymarks proceed to the different parts of the river frequented by the swans for breeding, and other places where they are easily accessible. They provide for the young bird to the fishermen who have made nests for the old birds, and two shillings per week to any person who during the winter has taken care of the swans by sheltering them in ponds or otherwise protecting them from the snow or frost.

Where, as it sometimes happens, the cob bird (male) of one owner mates with a pen bird (female) belonging to another, the brood are divided between the owners of the parent birds, the odd cygnet (except in Buckinghamshire) being allotted to the owner of the cob.

The young or brown birds, being marked with the marks of their respective owners and pinioned, are put into the river, as are also the white or old swans after the completing their moult. Under the pinning of such天鹅, account of their weakness, had in their first year been deprived of one joint only of the wing. If any white swans are found by the king’s mark in an open and common river or creek, he seizes them, and the same swan mark is put upon them. But swans kept in private waters need not be marked. A subject who has white swans not marked in his private waters may take them upon fresh pursuit, if they escape therefrom into an open and common river; though it is otherwise if they have been granted as liberty, and are swimming in open rivers without such pursuit.

The king had formerly a swannery (mageristus deductus cygnorum, Rot. Parl., 16 R. II.; 4 Inst., 260) not only on the Thames (6 Rot. Parl., 1, ii. Vill. i., 390), but in several other parts of the kingdom (Abb. Rot. Original., 266 b; Cal. Rot. Pat., 174 a). We find persons exercising the office of ‘master of the king’s swans’ (sometimes called the swannship) within the counties of Huntington, Cambridge, Northampton, and Lincoln (6 Rot. Parl., 360 b), and at the same time the office of ‘supervisor and approver’ of all swans being within any mere or water in the first three counties (ib., 360 b).

Antiently the crown had an extensive swannery connected to the royal residence or manor of Clarendon in Wiltshire. It had also a swannery in the Isle of Purbeck (Hutchins, Dorset, vol. i., pp. 24, 171); and by an entry in the council-book of 16th March, 1635, now at the Privy Council Office, appears the inhabitants complained that their means of maintaining this favorite and furnishing the king with swans were lessened by ‘com on shooters in guns.’

Stealing swans marked arl pinioned, or unmarked, if kept in a moat, pond, or private river, and reduced to tame- swans, is felony. (1st Edw. IV., 2 W. IV., 69.) Stealing swans not so marked or so kept, or so pursued, is merely a trespass or misdemeanor. (Dalton’s Justice, c. 156.)

The law is said to have formerly been, that when a swan is stolen in an open and common river, lawfully marked, ‘the same swan (if it may be) or another swan shall be furnished by the king with the swan be covered with the wheat.’ (7 Co. Rep., 18 a.)

Under the 11 Henry VII., c. 17, stealing the eggs of swans out of their nests was punished by imprisonment for a year, and a fine at the king’s pleasure. But this enactment was superseded by the 1 Hen. VIII., 27 § 2, which declares that every person taking eggs of swans out of their nests, or wilfully breaking or spoiling them, may upon conviction before two justices be committed to gaol for three months, unless he pay to the churchwardens of the parish from the year during which the one month of his commitment become bound, with two sureties in 20l. a-piece, never to offend again in like manner. And see Calend. Rot. Pat., 133 b, 165 b, 166 a, 168 a.

The 2 Henry IV., c. 21, which directs that no lord shall give any livery or sign to any knight, esquire, or yeoman, contains a proviso, that the prince may give his honourable livery of the Swan to his lords, and to gentlemen his mals. (2 Henry IV., c. 21.)

(See Blomfield’s Norfolk; Kemp’s Lovely MSS.; Archæologia, vol. xvi.; Colonel Hawker.)

CHAS. EVET, HERMANN VAN, called the Hermit of Italy, one of the most eminent landscape painters of the Dutch school, was born in 1616 or 1626, at Vorden, in the province of Gelder. It is generally supposed that he was at first a pupil of Gerard Dou; he however went, very young, to Italy, where, having chosen landscape painting as the branch of the art most con- venient for the small and commonplace subjects to which he was disposed, he there studied it, and soon proved himself worthy of so great a master. He was unremitting in his study of nature, and his retired way of life, which was wholly devoted to his art, caused him to be called ‘the hermit,’ by which name he was soon generally known in his own country. His etchings bear the stamp of a faithful imitation of nature. The scenes which he represents are diversified and picturesque; the perspective, light and shade, the tone of the
sky, are admirable, and expressed with a firmness and
decision that indicate the hand of a master. It is said that,
in company with Claude, he was fond of observing the
effect of the first faint tinge of the morning light on the
surfaces of objects, and the changes that gradually take
place as the sun rises higher in the heavens, and as he
progressively declines from his meridian splendour; effects
which are delineated with so much truth and beauty in
Claude's four splendid pictures of Morning, Noon, Even-
ing, and the gold of hope, on the gable of his house, whence they were removed by order of Napoleon to Mal-
maison, and, after the treaty of Paris, not restored to the
elector, but sent by the emperor Alexander to St. Pe-
trus.

Swannevelt's pictures have the sweetness and tenderness of
Claude, but they want his warmth, and are less strik-
ing in their effect; but his figures both of men and animals
are superior to those of Claude. His paintings are ex-
cessively rare as well as his drawings. Dr. Waagen, in his
work on the 'Arts in England,' mentions only a single picture by
Swannevelt as having been seen by him. This was at Luton House, in the collection of the Marquis of
Bute, of which he says, 'It is a large landscape of extraor-
dinary beauty in the composition, very clear in the colour-
ing, and careful in the execution.' His etchings, 116 in
number, have never been surpassed in the choice of the sub-
jects, the judicious distribution of light and shade, the per-
fect effect of the strokes, and especially in their ability to
convey to the spectator the spirit and perfection of the execution. To appreciate their
merit, we must have good impressions, which usually have the master's name on them; for the plates have passed through many unskilful hands, and many can scarcely be recognized as his. It is not only the art, but even the work of
his life, that they were sold at excessively high prices. The
time of his death, which took place at Rome, is rather un-
certain; some say it was in 1690, others in 1698: the latter
date appears to be the most correct.

(Pilgrim; Fuseli: Consolations Lexion; Wag.)

Swanes, a family of web-footed birds, belonging to the
family Anatide, order Anseres of Linn.ens.

For a general notion of the position of the subfamily
Cygnine, genus Cygnus Meyer, the articles Ducks, Ful-
laines, and Geese should be consulted.

In the first of these articles [vol. i, p. 175] will be found
the arrangement proposed by Mr. Vigors.

Mr. Swainson makes the genus Cygnus the first of his
subfamily Anserine, with the following character:

Size large. Base of the bill tumid, fleshy, and naked.
(Classification of Birds.)

The Prince of Canino, in his Birds of Europe and North
America, arranges under Anseres as his fifth order of birds.
The Anatide stand as the first order of the Anseres, and
comprise the subfamilies Cygnine, Anserine, Anatine, Ful-
laines, and Mergrine. The Cygnine consist of the five
species Cygnus, of which the Prince records Cygnus
Olor, Cygnus immutabilis, Cygnus muscicus, and Cygnus
brachy, as European species, and Cygnus Americana and
Cygnus Bucinale, as American species. The Cygnine
in the Prince's method are immediately followed by the An-
serine.

The Anatide form the first family of Mr. G. R. Gray's
eighth order, Palmpiders, Cuv. The Cygnine compose the
fifth subfamily of the Anatide, and are placed between the
Anserine and the Anatine. The Cygnine are placed under
Microcygnus, G. R. Gray (Anas, Gm. Bernitha, Steph, Chenicus (Brooke), Eyon, Anserella, Sw. ?). The
subfamily is placed between the Anserine and the Anatine.
(List of the Genera of Birds, 1st edition.) In the second
edition of the same useful work, the Cygnine form the
fourth subfamily; the third subfamily of the first order,
Cereopsis, being cancelled, and the genus Cereopsis trans-
ferred to the subfamily Anserine.

Only two true swans are recorded by Linn. and those as
varieties of Anas Cygnus, viz. var. a, Cygnus ferus, and
var. b, Cygnus mansuetus. Since his time the researches of
zoologists have added considerably to the catalogue.

The peculiarities of organization in this subfamily deserv-
ishing of the attention are the great length of the neck, consisting of
23 vertebrae, and the cavity in the sternum for the reception of
a considerable portion of the trachea.

Generic Character of Cygnus.—Beak of equal breadth
throughout its length; higher than wide at the base; de-
pressed at the point; both mandibles furnished along the
sides with transverse serrated lamellae. Nostrils oblong,
lateral, near the middle of the beak. Neck slender and very
long. Legs short, the hind too small and free. (Yarrell.)

EUROPEAN AND ASIAN SWANS.

Cygnus ferus, Ray.—Male.—Pall white, with occasionally
a buff tinge on the top of the head. Bill black and de-
pressed anteriorly, quadrangular at the base and yellow,
which tinct extends forward along each lateral margin of
the upper mandible beyond the aperture of the nostrils, which
are black; bare space between the base of that mandible
and the eye also yellow, which colours the back part of the
lower mandible. Iris brown. Feet black. Length with
neck stretched out, about five feet. Across expanded wings
about eight feet.

Female.—Similar to the male, but smaller, and the neck
more slender.

Young.—Those that we have seen, when about a week
old, have been covered with a grey down above and a
whitish down below, with flesh-coloured feet, or rather of
a dusky flesh-colour; the bill flesh-coloured, and rather dusky
above, anteriorly. Mr. Yarrell states that at ten weeks old
the bill is dull flesh-colour, the tip and lateral margins black;
the head, neck, and all the upper surface of the body pale
brown; the under surface before the legs of a paler brown;
the portion behind the legs dull white; the legs, like the
bill, of a dusky flesh-colour. This description was taken
from young birds in the Garden of the Zoological So-
ciety in the middle of August. In the middle of October
the same zoologist found the bill black at the end, with a
reddish-orange band across the nostrils, and the base
and lore pale greenish-white; the general colour pale grey-
and a few of the smaller wing-covers white, mixed with
others of a pale buffy-brown, and the legs black. He also
observes that the young Hooper bred in 1839 had almost
all their brown feathers at the autumnal moult of 1840, and
that before their second winter was passed they were entirely
white. (British Birds.)

This is the Cygnus muscicus of Bechstein, and, as there
are now more than one wild species well defined, the Prince
of Canino and others adopt that specific name, instead of
the original ferus; but the propriety of this may be doubted.
It is the Cygne Sausage of the French; Cigno and Cigno
Musciosa of the Italians; Singschaten and Nordstädtische
Singschaten of the Germans; Wild Swan of the Danes;
Hooper, Elk, and Whistling Swan of the modern British;
and Alerch gwulf of the ancient Britons.

Geographical Distribution.—Northern regions of Europe
and Asia, residing in summer within the arctic circle, Ice-
land, Scandinavia. Winter visitor to the British Islands
(where however it has been known to breed in the Shetland
and Orkney Islands and in Sutherlandshire), Holland,
France, Provence, Italy, and a few to Mr. Bennett, going
as far south as Barbary and Egypt. Eastward it
extends as far as Japan. This species is in all probability
the swan so much celebrated by the ancient poets for its
dying song.

Habits, &c.—The note of this wild swan resembles the word 'hoop' uttered several times successively. They fly
in a wedge-like figure, uttering this note as they proceed,
and when heard from above it is not unmusical. The appa-
ratus for producing these sounds was known to Aldrovandi,
Sir Thomas Browne, Wilthby, Ray, Latham, and others. Mr. Yarrell, who has paid so much attention to the trachea of birds, has thus well described it:—

'The cylindrical tube of the trachea or windpipe passes down the whole length of the long neck of the bird, in the usual manner, but descends between the two branches of the forked bone called the merythought, to a level with the keel of the breast-bone or sternum. The keel of the breast-bone is double, and receives between its two plates or sides the tube of the trachea, which, after traversing nearly the whole length of the keel, turns suddenly upon itself, passing forwards, upwards, and again backwards, till it ends in the vertical bone of divarication from whence the two long branchial tubes go off, one to each lobe of the lungs. The depth of the insertion is not so considerable in females or young males.'

Sternum of Hooper with a portion of one side of the keel removed to show the contained tube within. (Yarrell.)

The Hooper, like the rest of the Swans, feeds on aquatic plants and insects, can keep the head under water for some time, but never dives. The large nest is constructed on the ground with flags, rushes, leaves, and marshy plants. The eggs, six or seven in number, are whitish tinged with yellowish-green. Length of egg 4 inches, breadth 2½ inches.

This species breeds in captivity, and may frequently be seen on ornamental pieces of water in a half-domesticated state.

Cygnus Bewickii.—Independent of external characters, the anatomical distinctions pointed out by Mr. Yarrell, who first proposed to separate the species under the name here given, clearly point out the difference between it and the Hooper. 'The principal and most obvious difference,' says Mr. Yarrell, 'is in the trachea. The tube of the windpipe is of equal diameter throughout, and, descending in front of the neck, enters the keel of the sternum, which is hollow, as in the Hooper, traversing the whole length. Having arrived at the end of the keel, the tube, then gradually inclining upwards and outwards, passes into a cavity in the sternum destined to receive it, caused by a separation of the parallel horizontal plates of bone forming the posterior flattened portion of the breast-bone, and producing a convex protuberance on the inner surface. The tube also changing its direction from vertical to horizontal, and reaching within half an inch of the posterior edge, is reflected back after making a considerable curve, till it once more reaches the keel, again transversing which, in a line immediately over the first portion of the tube, it passes out under the arch of the merythought; where, turning upwards and afterwards backwards, it enters the body of the bird, to be attached to the lungs in the usual manner. This is the state of development in the oldest bird I have yet met with. The degree next in order, or younger, differs in having the horizontal loop of the trachea confined to one side only of the cavity in the sternum, both sides of which cavity are at this time formed, but the loop of the tube is not yet sufficiently elongated to occupy the whole space; and the third in order, from a still younger bird, possesses only the vertical insertion of the fold of the trachea.' Mr. Yarrell adds however that in this case the cavity in the posterior part of the sternum already exists to a considerable extent.

Bewick's Swan is much smaller than the Hooper, the whole length being from three feet ten inches to four feet two inches.

'Swans,' says Mr. Yarrell, 'as they appear here in the plumage of their first winter, are greyish brown. At their second winter, when they have acquired the white plumage, the irides are orange; the head and breast strongly marked with rusty red; base of the beak lemon yellow; when older, some continue to exhibit a tinge of rust-colour on the head, after that on the breast has passed off. The adult bird is of a pure unsullied white; the base of the beak orange-yellow; the irides dark; the legs, toes, and membranes black.

The anterior part of the bill is black, and, in the males, orange-yellow at the base, which is of a lemon-colour in the females.

Geographical Distribution.—North of Europe and America certainly, and of Asia probably. It breeds within the Arctic Circle, and in Iceland in May, according to Temminck, who says that it has been found on the maritime coasts of Piardy. It is an occasional visitor to the British Islands, especially in severe winters.

Habits, nest, etc.—According to Captain Lyon, is constructed of moss-peat, is nearly six feet long, four and three-quarters wide, and two feet high on the outside, with the cavity a foot and half in diameter. The eggs, six or seven in number, are of a yellowish-brown, according to Temminck; brownish-white slightly clouded with a darker tint, according to Lyon. The call-note of this species is said to be a low-toned whistle, according to Mr. Sinclair, but this was in confinement. Mr. Blackwall describes their calls in their wild flights as loud, and says that a flock of twenty-nine of them were very clamorous.

The Polish Swan, Cygnus immutabilis of Yarrell, is another wild species, and its crysytans, unlike those of the other white swans, are pure white. It has been kept in captivity. Mr. Yarrell states that Lord Derby purchased a pair of these swans and sent them to Knowsley. The female died. The male paired with a Mute Swan, Cygnus Olor, and a brood was the result; but the hybrids, though old enough, neither paired among themselves nor with any of the Mute Swans on the same water.

The following is Mr. Yarrell's description of the Polish Swan:—

'In the adult bird the beak is reddish-orange; the nail, lateral margins, nostrils, and base of the upper mandible black; the tube, even in an old male, of small size; the irides brown; the head, neck, and the whole of the plumage pure white; legs, toes, and intervening membranes slate-grey. From the point of the beak to the end of the tail, fifty-seven inches. From the carpal joint to the end of the second quill-feather, which is the longest in the wing, twenty-one inches and a half; tarsus four inches; middle toe and nail five inches and three-quarters. Its food and habits
The Birds assigning noted the Specchio C. whitish at measurements states that he has verified all his observations. Cygnus Olor (Genus Olor, Wagl.).—Our Mute half-domesticated Swan is too well known to require description. The trachea has none of the complicated structure of that of the Hooper, and is even more simple than that of the Black Swan. The large tubercle, or berry, as the swan-herds term it, at the base of the bill, at once distinguishes this graceful species from its congener.

It is the Cygne of the French; Cigno and Cigno Reale of the Italians; Schwaan and Hocker Schwan of the Germans; Tame Swan of the Danes; Tame Swan or Mute Swan of the modern British; and Alarch of the ancient Britons.

This elegant bird is said to exist in a wild state in Russia and Siberia. The Prince of Canino, in his Specchio Comparativo, speaks of it as occurring in the neighbourhood of Rome (‘Raro Avventizio d’inverno’) and in his ‘Birds of Europe and North America’ he gives North-Eastern Europe as the locality. The Polish Swan above noticed should not be forgotten in assigning these northern localities to our Tame Swan, and very probably was not by the skilful ornithologists who have noted these localities. Terminick says, ‘Habite en état sauvage les grandes mers de l’intérieur, surtout vers les contrées orientales de l’Europe.’

In the Thames, at present, the greatest number of swans belong to the Queen, and the companies of vintners and dyers own the next largest proportion; but the birds are far less numerous than they used to be. The swan-marks are made upon the upper mandible with a knife or other sharp instrument. The swan-hopping or upping, that is, the catching and taking up the swans to mark the cygnets, and renew that on the old birds if obliterated, in the presence of the royal swanherd’s man, is still continued by the companies above mentioned. Below is the royal swan-mark used in the three last reigns and the present, from the cut given by Mr. Yarrell, in whose interesting British Birds much curious information on this subject, together with no less than sixteen swan-marks, will be found.

**Head of Mute Swan.**

**Head of Black Swan.**

Mr. Yarrell observes that the structure of the trachea is intermediate between that of the hooper and the common mute swan. It ‘quits the neck at the bottom, and descends to the centre circular portion of the furcula, to which bone it is firmly bound by a tough membrane; the remaining portion then rises over the front of the breast-bone between the clavicles, and passes backward to the lungs, the last portion of the tube immediately preceding the bone of divarication being flattened horizontally. The form of the trachea in our common swan, in which it follows the neck

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**American Swans.**

Dr. Richardson (Fauna Boreali-Americana) records only two American swans, Cygnus Bucephalus and Bewickii. The Prince of Canino, in his ‘Specchio Comparativo,’ gave one, Anas Cygnus (meaning, apparently, the hooper). Nuttall notices three: 1st, the wild or whistling swan, Cygnus ferus of Ray; 2nd, the trumpeter swan, Cygnus Buc- cinator; and 3rd, Cygnus Bewickii. The Prince, in his ‘Birds of Europe and America,’ records two species, Cygnus Americanus, Sharpl. (Cygnus multus, Bodas); and Cy-
without deviation, being remembered, and Dr. Latham's figure of the wild swan referred to, it will be observed that the black swan exhibits an interesting link between the two.' (Linn. Trans., vol. xiv.)

Swansea is a seaport town of Glamorganshire, 204 miles from London on the mail-coach road through Bristol and Carmarthen to Milford, is situated on the right bank of the river Tawe, which falls into the Bristol Channel at Swansea Bay, close to the town. The harbour, which is left nearly dry at low-water, is formed by a pier springing from the land on each side, leaving an opening for the admission of shipping; and there is also a cross-pier within the harbour. On the western pier there are a lighthouse and watchhouse. Vessels of 300 tons are enabled to load and unload at the wharfs. The communication between the two banks of the river is by a ferry; but it has been proposed to erect either a suspension-bridge or to form a floating harbour with a swing-bridge. On the north-east and north-west the bay is backed by lofty hills, and the beach consists of an extensive level of firm sand. Swansea is the port of a rich mineral district. The principal branches of industry are the smelting of copper-ore and the export of coal. Copper-ore is brought from Cornwall, Devonshire, parts of Wales, Ireland, and from foreign countries. From 1821 to 1827 the quantity of copper-ore sold at Swansea averaged 5557 tons; and from 1828 to 1833 inclusive, 13,569 tons. In the year ending 30th June, 1839, the quantity of ore smelted was 49,337 tons, valued at $57,847: and the quantity of metal obtained was 7293 tons, or 14% per cent. Of the above quantity of ore, 22,238 was foreign, producing 5090 tons, or 21% per cent. of metal. The quantity of coal and culm supplied coastways was 476,569 tons in 1838, 486,729 in 1839, 460,201 tons in 1840, and 450,119 in 1841; and more than one-half of the above quantities consisted of stone-coal or anthracite. The annual export of coal to foreign countries averaged 9189 tons from 1828 to 1834, and 7553 tons from 1835 to 1841 inclusive. Iron-ore is not at present smelted at Swansea. Besides the works for smelting copper, there are iron-foundries, yards for building and repairing ships, roperies, tanneries, breweries, and two potteries. The number of vessels belonging to Swansea in 1830 was 182, of 7772 tons. In 1841 the number above 50 tons was 86, aggregate tonnage 10,116 tons. In 1840 the gross revenue of customs duties collected at the port was 5008/, valued at the customs house at Swansea. The number of vessels engaged in foreign trade is considerable, and it is calculated that between 60 and 70 ships are engaged in foreign trade from 9 to 12 months in the year. The trade of the town has increased very rapidly during the present century, and Swansea is now a thriving place, well-paved, and lighted with gas, and most of the houses are modern and well-built. In the latter part of the last century several houses have been erected in favourable situations, commanding views of the bay. The number of persons resorting to Swansea for the benefit of sea-bathing is annually increasing. There is a communication by steam-boats with Bristol and Ilfracombe, and the Bristol and Liverpool steam-boats land and take up passengers from Swansea pier. The population of Swansea more than doubled between 1801 and 1831. The parish consists of four divisions: the 'Franchise,' sometimes termed the town, which contained 5599 inhabitants in 1831; Swansea Higher, 678; Swansea Lower, 559; and the hamlet of St. Thomas, which lies east of the harbour, contained 438 inhabitants: making the total population 14,931. The increase of population has been very considerable during the last 40 years.

Before the passing of the Reform Act Swansea was a contributory borough to Cardiff, which, with several other places, returned one member to parliament; but it is now a principal borough, and returns one member in conjunction with Morriston, Kenfig, Aberswan, and Abertawe, as one of its contributory boroughs. The limits of the parliamentary borough were extended by the Reform Act, so as to comprise the hamlet of St. Thomas and a considerable district on each side of the river north of the town of Swansea. The number of registered electors for Swansea, &c. in 1839-40 was 1371. The corporation claims to be a corporation by prescription, but the earliest charter is dated 18 Henry III. They have in their possession the translation of a charter granted to them by John, earl of Gloucester, in the reign of Henry II., promising the lands and privileges of the lord of the seignory of Gower; and also one of 2nd Henry III., granting the lands of Gower to the wife of John de Mowbray. The duke of Beaufort is the present lord of Swansea.

Before the passing of the Municipal Corporation Reform Act in 1835, the corporation were in possession of an estate of six hundred acres, called the Town Hill, and some land upon the shore of the bay. The corporate body consisted of a mayor, twelve aldermen, and eighty councillors. There are courts for the recovery of debts, and petty sessions for the hundred and the Michaelmas quarter-sessions for the county are held at Swansea. There are fairs in May, July, August, and October, and markets every Wednesday, Friday, and Saturday.

There are two churches in the parish, and above fifteen chapels belonging to different denominations of dissenters. St. Mary's church is 72 feet by 54, and has a lofty square tower. St. John's is a small edifice, and was formerly a chapel belonging to the Knights of Jerusalem. The living of the former is a vicarage, of the gross annual value of 302/; and the latter is a perpetual curacy, valued at 87/ per annum. The principal public buildings are the South Wales Institution, the Philosophical Institution, the Assembly Rooms, the West India House, the Free Church, the Infirmary, the theatre, the house of correction, the union workhouse, the town-hall, and the assembly-rooms. The only remains of the antient castle are a massive square tower, which commands a fine view of the bay. The town-prison and the workhouse are supplied with hot water, and there is a horse-pump. The town contains an earl of Warwick, who subjected the sons of the prince of Gower. Henry de Gower, bishop of St. David's, founded an hospital at Swansea in 1332. The infirmary and a dispensary are supported by donations and subscriptions. In 1694 Hugh Gora, bishop of Worcester, founded and endowed a free-school, and, with 20l. given by the corporation, it has an income of 60l. a year. In 1831 an infant-school was established, which was attended in 1833 by 218 children, and is supported by a subscription fund of £100, which is distributed among daily schools, three of which were chiefly supported by subscriptions; and there were eleven Sunday-schools. In the higher and lower divisions of the parish there were three daily and three Sunday schools. There is a mechanics' institute.

SWARTZ, OLOF, a celebrated Swedish botanist, was born in the year 1760, at Norrköping in East Gothland, where his father was a considerable manufacturer. He commenced his studies at Upsala when Linnaeus died. Having acquired a taste for botany, he made several excursions in the years 1779-80 and 82, through various districts of Sweden, for the purpose of studying their botany, and visited Lapponia, Finland, and Gothland. In his 29th year he went to Upsala as an assistant, and presented a thesis entitled ' Methodus Museum. Illustrata.' In this work he gave a new arrangement of the mosses, and laid the foundation for a larger work, entitled 'Disposito
Systematica Museorum Frondosorum Suecic, which was published at Erlangen in 1799. This work was illustrated with plates and descriptions of many new mosses. In 1783 he visited Jamaica and other islands in the West Indies; and, oacd with botanical treasures, he visited England on his return home, in 1788. He remained in this country a year, during which time he was occupied in examining the plants sent by Sir Joseph Banks, Sir J. S. Smirke, and other botanists. He returned to his own country in 1789, and was elected a member of the Royal Academy of Sciences of Stockholm in 1790, and was appointed professor of natural history in the University of Stockholm in his native country. Jussieu was also honoured by being made a knight of the order of Vasa and of the Polar Star. In 1788 he published at Stockholm his "Novus Genera et Species Plantarum," this work contained a description of the plants which he had collected in the West Indies. In 1791 he published the "Synopsis Fluminianae," which, with various other descriptions of plants and flowers, was a great addition to the vegetable knowledge of that time. This work was succeeded by his "Observationes Botanice," containing remarks on the structure and affinities of the plants of the West Indies, in 1791. From 1794 to 1800 he published in folio the "Icones Plantarum Incognitorum," which contained drawings of the rarer plants which he had discovered in the West Indies. He completed his labours on the botany of this part of the world by the publication of his "Flora Indica Occidentalis" in 1806, which appeared in 3 volumes. In 1787 and 1788 plants discovered on West Indian botany were entirely devoted to the phanerogamic or flowering plants; but he did not neglect cryptogamic plants, and in 1806 he published the "Synopsis Fluminiana," which he added to the "flora," and now in the botanic garden of fers. After these publications he turned his attention more particularly to the botany of his own country, and published anonymously at Stockholm, in 1814, a work entitled "Summa Vegetabilium Scandinavis," systematized co- ordinating.

He also contributed the text from the 5th to the 8th volume of the "Svensk Botanik," a national work on the botany of Sweden, produced by several authors. In addition to the above works, he contributed a number of papers on botanical subjects to the Transactions of various scientific societies. Among these are, the "Transactions of the Linnean Society," of which he was a foreign fellow. He also contributed several papers on zoology to various journals and Transactions.

He died in the year 1818.

As a botanist Swartz ranked amongst the first of his day, and was a worthy disciple of the school of Linnaeus. His principal labours were directed to descriptive botany, in which he was remarkable for acuteness without prolixity, purity of style, and neatness of composition. He has contributed greatly to our knowledge of the vegetable kingdom, having added upwards of 50 genera and 850 species to the list of flowering plants, besides a great number to the list of Cryptogams. One of his most important contributions has been named after him "Swartzia." A volume of his posthumous papers, with notices of his life and labours, by Sprengel and Aagardh, was published at Stockholm in 1839, by J. E. Wickstrom, under the title "Adnotationes Botanicae quae reliquit O. Swartz." "Swartzia," the name of a genus of plants, given by Willdenow in honour of Olof Swartz, a Swedish botanist.

Swartz This genus belongs to the great natural order Lepidocarpoidea and to the family of Lepidoptera. This order was divided by De Candolle into two groups, Curvibrachiata and Rectibrachiata: the former with the radicle of the embryo bent back upon the cotyledons; the latter with the radicle straight. The curvibrachiata group contains two suborders, viz., the cauliflorous and the axillary. The suborder Swartzia is known by possessing a bladdery calyx with indistinct lobes, and hypogynous stamens, and by being either destitute of corolla or having only one or two petals. The other genera in this order are Baphia and Zollernia, and these are natives of South America and the West Islanda.

The genus Swartzia is known by its calyx being divided into 3 or 4 pieces or teeth, which are at first united, but afterwards break up and remain as small teeth on the peduncle, which is frequently lateral; sometimes this is entirely wanting. The stamens are 10, 15, or 25 in number, with frequently 2 or 4 of them much longer than the others, and the rest are often connected a little way at the base. The seeds are almost roundish, and do not get into the leaves of this species are simple or unequally pinnate leaves.

P. C. N. 1470.

SWEARING: A profane use of the name of the Deity. By the 109th canon, churchwardens are to present those who offend their brethren by swearing, and notorious offenders are not to be admitted to communion until they are reformed. Profane cursing and swearing were first made an offence punishable by law by 20. J. C., c. 21 (continued by 3 Ch. L., c. 4; 16 Ch. L., c. 4; and 6 and 7 W. III., c. 11). The practice however does not seem to have diminished, for, subsequent to these acts, we find Swift and Defoe writing. It is stated, that in London, there is only one species, the B. nitida, which grows in Sierra Leone, and yields the cam-wood, or king-wood of commerce. It is brought to this country, and used in considerable quantities as a dye of a red colour: hence the name, from Baphe (baphe), a dye.

The genus Zollernia is a native of Brazil. It was so named in honour of Frederick William III., late king of Prussia, who was descended from the princes of Hohenzollern.

The soil best suited for the cultivation of these plants is a mixture of sandy loam and peat. Cuttings with their leaves on may be grown under a hand-glass in a pot of soil.

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internal fire; there was violent fever, pain in the head and limbs, prostration of strength, hurried breathing, a small frequent sweat, great thirst, restlessness. Shortly after the appearance of these symptoms a profuse clammy febrile perspiration broke out over the whole body; the thirst became more intolerable, and the patients either died or recovered as suddenly as they had been first attacked. Such was the rapidity with which this disease ran its course, that its victims were sometimes carried off in three or four hours, or even before the sweating stage had set in; and all danger was past if the patient lived at an end if he survived the first twenty-four hours. The profuse sweating which characterised the disease was looked upon as an effort of nature to get rid of some morbid matter from the system, and the easy appearance of this stage was therefore regarded as a favorable sign. Accordingly, Dr. Raver's patients and Dr. C. H. A. Mead believed it to be a modification of the plague; and Dr. Mead says that it was imported into this country from France, whither it had been conveyed in 1480, from the island of Rhodes, at that time besieged by the Turks. Caius having been a slave in this country, and his descendants came to England from Florence and Naples, at which places the plague was then raging, and that it was the same disease, only modified by climate. Dr. Cullen thought it a variety of typhus; and Dr. Williams, who witnessed the appearance of the disease, declared that the perspiration covered the patient in the wheat at those periods at which it prevailed, just as the Asiatic or malignant cholera has been attributed to the eating of bad rice. Opinions are not less at variance respecting the antiquity of this disease, and its identity with that which still prevails on some parts of the Continent, to which the term of "La Suedte" has been applied. M. Rayet, without giving a decided opinion on the subject, admits that although there are notable differences between the two diseases in point of symptoms, there is a close resemblance between them. It is perhaps impossible at this distance of time to decide the question: we shall therefore conclude this article by referring those who may feel an interest in this subject, to the admirable work, "Sammandrag af Sweert-Miittero qui a régné en 1821, dans les Déraperntener de l'Oise et de Seine-et-Oise," 8vo., Paris, 1832.

SWEDBERG, JESPER. A Swedish prelate and theological writer, was born on the 28th of August, 1653, at Sweden, near Fahlum, the estate of his parents, Dania Israel and Anne Bullemus, who were members of a respectable family among the miners of Stora Kopparsberg. Swedberg took his degree at Upsala in 1682, was appointed chaplain to the Royal Guard in 1684, chaplain to the court in 1685, was translated to the living of Visby in 1686, and was called to Upsala as professor of theology in 1692, and made primate and provost of the cathedral of that place in 1704. Charles XI. appointed him over the Swedish communities in Pennsylvania (America); and in 1762 Charles XII. created him bishop of Skars in Westrogothia. In 1705 he became doctor of theology at Upsala; and in the same year Charles XII. placed him over the Swedish communities in London. He procured for the city of Skars a privileged press, was a principal in the living of Visby in 1716, and was made bishop of Skars, after two years, in 1722. In 1750 he was made bishop of Stockholm, and in 1769 he returned to Upsala, where he died, in 1783, aged 90. He was the founder of the convent-church of Varnhem. Bishop Swedberg was three times married: first, to Sarah Behm [SWEDENHORN, EMANUEL]; secondly, to Sarah Berghia; and thirdly, to Christina Urbanus: he had seven children, four daughters and three sons, of whom the eldest was Emanuel Swedenborg. (Gezelius, Försök till et Biographiskt Lexikon, 8vo., Stockholm, 1778-80.)

The bishop's writings are voluminous, and they are not confined to theology; they are very varied. The first of this writer was one of the earliest writers on Swedish orthography: his book on this subject drew down on him the censure of one Urban Hjärne, who, in a violent pamphlet that he put forth in the form of dialogue, accused the worthy bishop of being a humbug in literature. A very complete list of Swedberg's extensive works may be seen in the Catalog. Libr. Impr. Biblioth. Reg. Acad. Upsal. 3 tomas, 4 tomo. (1814.)

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as follows: 'Manuscript: The Life of Jesper Swedberg. Bishop of Skarab, written in detail by himself, in accordance with the Divine truth his own best explanation of God and of his wonderful Providence; and to give to his children and posterity necessary instruction for passing through life happily; whereof may God grant them his grace.'

Bishop, "Jesper Swedberg,' says the Rev. Nicholas Collin, rector of the Swedish church in Philadelphia, was well qualified for one of the principal bishoprics in Sweden. He was born Dec. 17, 1792, and died in 1847. The bishop's influence awakened that patriotic fortitude which sustained such burdens and misery, and blazed in so many battles! His popularity gave particular energy to some public regulations, which lessened the havoc of pestilence: a judicious and pathetic address to the people convinced them thaterring in new grounds was a necessary measure, though a temporary sacrifice of their laudable attachment to the con- servative principles so cordially compromised by their beloved relatives reposed. The bishop was for many years superintendent of the Swedish mission about Delaware. His letters to the clergy and to the congregations, which are preserved in its records, bear witness to his kindliness, humanity, and temperance, and they are most acceptable to the missionaries to inform them of any extraordinary events in the moral and physical world which happened in those parts of America.'

SWEDEN, a country in Europe, which occupies the tract of land adjacent to the Baltic, and lies between the eastern and western parts of the Baltic Ocean, and is situated between 55° 20' and 69° N. lat., and between 11° and 27° E. longitude. About one-sixth of the country lies within the Polar Circle. On the east of Sweden, from its southern extremity to 66° N. lat., extends the Baltic and the Gulf of Bothnia; the latter is divided by a parallel of 64° N. lat. into two countries, which are contiguous, and continue so to the most northern point of Sweden, and in this part the boundary runs up along the Torren Elif to its confluence with the river Muonio, which takes place near 67° 10' N. lat. Further north the course of the Muonio constitutes the boundary as far as the confluence of its two upper branches, the Litja Eno and the Königsmi, from which point it follows the course of the last-mentioned river to its source in the small lake of Kelljutan, which is one of the boundaries of Norway. The west of Sweden is Norway. The boundary between these two countries runs along the range of the Kullen Mountains, and as far south as 65° it follows the watershed, though not the most elevated part of the range. In these parts the water is divided between the rivers Kullen and the irregular line. Between 65° and 64° N. lat. Norway extends to the east of the watershed, and some branches of the Angerman Elven and Indals Elven, which fall into the Gulf of Bothnia, rise within Norway. South of 64° N. lat. the boundary returns to the watershed, and follows it to Mount Sylfellin (65° 3' N. lat.), whence it runs nearly in a straight line southward along a high ridge to Mount Heryehonga (61° 42' N. lat.). From this mountain it continues in a general southerly direction, but in a more irregular line, which is not marked by any natural feature, to its southern extremity a little south of 59° N. lat., when it turns west, and soon reaches a very long and narrow lake called Bulken, which extends northward, and is connected with the Cattegat by a sound called Swinesund. The boundary lies along the lake and sound. The Skagerrak washes the western coast of Sweden between 59° and 58°, and the Cattegat between 58° and 56°. North of 56° the strait called Oresund, or simply the Sound, begins, which extends to the most northwestern point of Sweden, Torrmudde, by which the Danish island of Zealand. South of Sweden is the western part of the Baltic, which separates it from Germany. [BALTIC, vol. iii. p. 347.]

The country from south to north is somewhat more than 900 miles: its width between 58° and 68° N. lat. varies from 150 to 200 miles; but south of 58° and north of 68° it is not so wide. Its area, according to the estimate of Forsell, is 3,068 Swedish square miles, equal to about 178,000 English square miles: it consequently covers a surface larger than that of the British Islands by 58,000 square miles, or by more than half its area, and falls short of the area of France only by about 34,000 square miles.

Coast.—The coast of Sweden is somewhat more than 1,400 miles, exclusive of the deep inlets. The coast along the Skagerack, Cattegat, and Sound is near 300 miles: the rest of the coastline is the Baltic. Along the most northern part of the Gulf of Bothnia that is called by the Swedes Botten Viken [Bothnia, Gulf], the coast is low, and consists of sandy alluvial matter brought down by the numerous rivers which fall into this part of the Baltic. Both the parts of the coast, as well as the character of the soil, are of the same character. The coast begins to rise as it approaches the Quarken, or strait which connects the Botten Viken with the Botten Hafvet or Sea of Bothnia, and the islands which lie across the strait are rocky. South of the Quarken a large long promontory, called Tornhamnsudde (63° 15' N. lat.), the coast presents an alternation of low and moderately elevated shores, in some places rocky, but in others sandy and composed of alluvium. The islands which line this tract of coast are less numerous than farther south, but larger, and they resemble the neighbouring coast, many of them being low and sandy, while others are undulating, and contain low rocky hills. A few of the larger islands, especially in the vicinity of the Angerman Elven, are partly rocky and partly covered with forest. The general feature of the coast is the gradual descent of the Swedish coast between Gelle on the north (66° 40' N. lat.), and the Bräviken near Norrkipping on the south (58° 35' N. lat.), has a rocky shore, indentured by numerous inlets, which are generally small, with the exception of those formed by the entrance of Lake Alster, and Lake Lagn in consequence of these inlets, this coast consists of a succession of small peninsulas. Though extremely rocky, the coast in general is of moderate elevation: in a few places it carries an island, which consists of a sandy beach surrounding a very small bay called Briviken, as far as the parallel of the northern extremity of the island of Oland (58° 22' N. lat.), the coast is partly rocky and somewhat elevated, and partly low and sandy. It is likewise intersected by many inlets, all of which run from east-south-east to west-north-west, so as to give to this part of the coast nearly the appearance of a saw. The rocky islands and cliffs which lie it are still more numerous than farther north, and render the access to it difficult. The large and semicircular strait of Calmar, which divides the island of Oland from the mainland of Sweden, runs in a less broken line, though there are a few indentations in its northern part, but these inlets are short. The shores are generally low. The islands in this district are composed of sand and gravel, which do not disappear almost entirely. The Strait of Calmar terminates on the south with Cape Tornhammaudde or Torrmuddde, a low rocky point east of Carlskrona, which at the coast, which up to this point extended nearly due north and south, suddenly turns to the west. This is the most broken rocky and elevated part of the coast of Sweden, and it extends to a few miles west of Carlshamn. Nearly the whole of this coast consists of rocks, sometimes rising 50 feet high with a steep ascent: but between the projecting masses, and especially at the mouths of the small rivers, it sinks nearly to the level of the sea; and such places generally form good harbours and anchorages, being protected from the wind and sea by the numerous islands which line the coast. The largest of these islands are at a short distance from Cape Torrnudde, and form the harbour of Carlskrona. [CARLSKRONA.] The rocky elevated coast terminates at the peninsula of Sjövestor; the shores of the peninsula of Sennia, which forms the most southern part of Sweden, being low, sand-barred, and composed of sand and gravel, but in a few places lined with sand-banks. Cape Kulen, which forms the northern entrance of the Sound on the east, is of moderate elevation, but north of it the coast sinks down rapidly to the level of the sea. And north of it, several inlets, up to which place no islands or rocks occur. The coast rises a little north of Warberg, and the rocky islands appear and increase in number as we proceed northwards; the coast also gradually rises higher, though the elevation never exceeds 30 feet. The coast is very rocky, and intersected by several large inlets, especially north of Göteborg, where
the arms of the sea run up to Uddevalla, and separate from the mainland two large islands, Tyhern and Orust, which are rather hilly. The other islands are only rocky cliffs of small extent and moderate elevation; and as we approach the boundary of Norway several of them consist of sand and other materials, which sink below the general level. This higher tract contains some good forests, but their situation, and still more the rapidity of the rivers, which do not admit either navigation or the floating of wood, render them quite useless, except as fire-wood for the use of the inhabitants. Nearer the sea is the lower region, the General level of which sinks from 15° to 20° below the general level. These hills are not usually steep, and there are small level tracts between them which are dry; but only the sandy border along the sea is covered with grass. The climate and the poverty of the soil. Potatoes and cabbages, and a little barley and rye, are grown. The inhabitants live mainly on the produce of their cattle. The lakes in this tract are few, and most of them hardly larger than ponds. The fir and pine cover the greater part of the country, and pitch and tar are made from them. The best portion of this lower tract is in the northern districts, where there is a large plain on both sides of the Calix Eif, which extends eastward to the banks of the Tornes Elf. This tract contains an average width of about 30 miles, and its general level is about 10 feet below the level of the Gulf of Bothnia. The average width of the Tornes Elf is about 10 feet, and that of its branches about 100 feet. The surface of the remainder of this tract rises and falls in gentle slopes, and in some places is occupied by cultivated meadows. The mountainous region extends north of the tract, and is never above mediocrit, with the exception of the plain between the Tornes and Lules Elf, which produces fine grass. This portion lies between the Lules Elf and the Gulf of Bothnia, and extends about 10 miles. The surface of the Skelleftea Elf is much better cultivated, but the fertile ground occupies a very small portion even of this tract: a little rye and oats, and a somewhat greater quantity of barley, are grown. The cultivation of potatoes has lately increased. The tracts used as pasture containing meadows, are of the same formation as the pine-woods. Forsell gives the following account of the Läns of Pitea and Umea, which comprehend nearly the whole of this region. The whole contains an area of 62,496 square miles, being about 6000 square miles larger than England, including Wales, and about 1000 square miles larger than the state of Georgia in North America. Of this area about one-fifth, or, more exactly, 12,499 square miles, are within the range of the mountains, and another 12,499 square miles, are in the elevated region; about seven-twentieths parts, or 21,333 square miles, are in the lower region; and only three-twentieths parts, or 9555 square miles, in the more level country on the shores of the gulf. The surface of this region is about 10,000 square miles.—All the cultivated tracts do not exceed 66 square miles, or about one-third of the smallest county in England, Rutlandshire. The meadows occupy about 370 square miles, and all the remainder is either covered with forests or a useless waste. More particulars of this region are given under BOTHNIA.

1. The Northern part of the mountain-region of Sweden, or that which extends from the banks of the rivers Muonio and Tornes to 64° N. lat., has a great uniformity of surface. The western districts, being occupied by the most elevated regions, are separated from the several parts of the mountainous region by the Kjelen ranges, of which the southern portion is a part of what is called Norska Fiellen, or the mountains of Norway. A more detailed description of both ranges is given under NORSKA FIELLEN, vol. xi., p. 5. Sweden.

2. The central part of the mountain-region, or that which lies between 64° and 62° N. lat., though in some regions it is hilly, consists in general of a large tract of level country, covered with the woods which we have described. The average width of the tract in this part does not exceed 170 miles. The highest part of this region, situated within the Kjelen Mountains, is much narrower, and never exceeds 30 miles in breadth, being usually 20 miles wide, and in some parts 30 miles less. Only a few summits are always covered with snow, among which the most elevated is the Syllfalen, or Syllfellen, which is 5860 feet above the sea-level. The rivers which originate in the higher parts of this region flow at first through rather dry unhabitied country, and only visited in summer by a few Laplanders, who find pasture for their reindeer on the declivities of the Syllfellen and the adjacent mountains. The country adjacent to this mountainous tract forms a kind of table-land, situated above 62° N. lat., and the inhabitants are thus enabled to maintain a greater number of cattle: they also take a great quantity of fish in the lakes, such as the Salmo alpinus, the Salmo thymolus, and the Salmo
12 miles wide. The river which issues from the north-east side of the lake is the principal feeder of the Indals Elf. [ANGORMLAND, vol. ii., p. 18.] This table-land forms a basin, being enclosed by higher land, which is not much more elevated on the east, but rises to a considerable height on the south. On the south the table-land is divided by a continuous range of very high ground from the upper valley of the river Ljungan. From the Kölén range, west of the basin, a branch advances into the basin for a few miles, and then terminates abruptly with the high surface of Mosseby, which is 472 feet above the sea-level: its declivities afford pasture to the reindeer in summer. The surface of the table-land, which may be called the table-land of Jemtland (Yemtland), may be considered as a table-land on the sea, as it extends beyond 1000 feet above the sea. It is very much broken, and interspersed with stony swamps. Besides the Great Lake there are ten or twelve others, each of them from 10 to 15 miles long, and more than a mile wide. In spite of the great elevation of the country, agriculture is carried on to some extent. Wheat does not succeed, but barley and oats are grown. Several kinds of vegetables, especially potatoes and peas, grow very well. The soil however is stony, and far from being fertile; and toward the end of August the crops are sometimes destroyed by frost. At a short distance from the sea, on a clear sky, the inhabitants light fires on the north side of their fields, to protect their crops against the destructive effects of the wind, which always brings frost. The pastures beyond Mosseby are extensive, and the domestic animals are rather numerous, especially cattle, sheep, and goats: there is also a due proportion of horses and hogs.

South of the table-land of Jemtland are the upper valleys of the river Ljungan and Ljusnan: that of the latter and Ljungan being divided into two branches, and formed a separate province in the ancient division of the country. These two valleys are of considerable width, and though interspersed with hills, they contain level tracts which descend to the sea. These upper valleys are more elevated than the table-land, that of Herjedalen being 1200 feet above the sea, in the eastern districts, and rising to about 1800 feet. Near the Kölén range the crops very frequently fail, and the inhabitants are obliged to mix the crops of the table-land with their breed. (This is also sometimes done on the table-land, but not so frequently as in these valleys, which are the most elevated part of Sweden in which agriculture is carried on).

From the high ground which forms the eastern border of the table-land of Jemtland, and which may be about 1200 feet above the sea-level, the country descends in a regular slope towards the sea, and at the distance of about 30 miles from it, sinks to 300 feet. There are no considerable rivers which cross it run in narrow valleys considerably depressed below the sea-level, in which they frequently expand in long narrow lakes, and usually form rapid and cataracts. In this tract agriculture is very limited, for the valleys alone can be cultivated. The middle of the tract is generally a broad alluvial level, in which the inhabitants are obliged to mix the crops of the table-land with their breed. (This is also sometimes done on the table-land, but not so frequently as in these valleys, which are the most elevated part of Sweden in which agriculture is carried on).

That elevated ridge which separates the valley of the Western Dalelvden from that of the Kirkelevden, preserves a considerable elevation south of 61° N. lat., running south-south-east until it has passed 60° N. lat., when it turns to south-west, and forms a part of the southern boundary of Sweden and Norway. This ridge has been described, and is between 3,222 and 3,260 feet above the sea, but south of 60° 30' N. lat. it is hardly more than 1500 feet above the sea; but south of that line it lowers rapidly, so that at its southern extremity, near 61° N. lat., it has sunk to nearly 500 feet above the sea-level. The narrow valleys of Ljungan and Ljusnan are separated from that ridge by an elevated part of the country which is inhabited by a few families who cut the wood in the fine pine-forests, with which the lower parts of the mountains are clothed. A few miles south of this ridge the country becomes extremely hilly, with an elevation above the sea of about 6000 feet, and having a very singular latitude, of 61° 40' 40" N.

The Southern part of the mountain-region lies south of 62° N. lat. Its southern boundary would be tolerably well marked by a line drawn from the great bend of the river Glommen in Norway at Kongsvinger, in a north-west direction to the point on the coast of Sweden near the island of Syljan, 60° 45' N. lat., and hence continued to the town of Södertalje, on the Gulf of Bothnia. Near the boundary-line of this southern part extends the land, of which the height is not so much more than 100 miles from north to south, but in proceeding east it grows gradually narrower, until, on reaching the shores of the gulf, it does not much exceed 50 miles. From west to east it extends nearly 200 miles. The area of this region is about 13,212 square miles, or somewhat more than double the area of England, which may properly be called mountainous, but which may properly be called mountainous is not extensive. It does not constitute a part of the Kölén range, but must rather be considered as an appendage of the norrskland. From the latter to the eastern termination of that extensive mountain-system, numerous ridges issue in all directions, so that this mountain properly constitutes a mountain-knot. To the east run three ridges enclosing the upper valleys of the rivers Ljungan and Ljusnan, between the main ridge and the sea. One of these, extending due southward, divides the lower country of Osterdalen on the Glommen in Norway from which extends over the middle districts of Dalecarlia, or Dalarna. The width of this mountain-region from east to west is about 70 miles, and its length from Mount Sylfelen (63° N. lat.) to near 61° N. lat., about 100 miles. The most elevated part of this region surrounds Lake Piamund in Norway, where several summits attain the snow-line, as the Tronflettet (5619 feet) and the Siliennefjellet (6452 feet) and the outer ridge of the great mountains, the general level of this range south as far 61° 30', is 4500 feet above the sea; but south of that line it lowers rapidly, so that at its southern extremity, near 61° N. lat., it has sunk to nearly 500 feet above the sea-level. The narrow valleys of Ljungan and Ljusnan are separated from that ridge by an elevated part of the country which is inhabited by a few families who cut the wood in the fine pine-forests, with which the lower parts of the mountains are clothed. About one-half of this mountain-region belongs to Norway. By a large river which separates the valley of the Western Dalelvden from that of the Kirkelevden, preserves a considerable elevation south of 61° N. lat., running south-south-east until it has passed 60° N. lat., when it turns to south-west, and forms a part of the southern boundary of Sweden and Norway. This ridge has been described, and is between 3,222 and 3,260 feet above the sea, but south of 60° 30' N. lat. it is hardly more than 1500 feet above the sea; but south of that line it lowers rapidly, so that at its southern extremity, near 61° N. lat., it has sunk to nearly 500 feet above the sea-level. The narrow valleys of Ljungan and Ljusnan are separated from that ridge by an elevated part of the country which is inhabited by a few families who cut the wood in the fine pine-forests, with which the lower parts of the mountains are clothed. About one-half of this mountain-region belongs to Norway.

According to Forssell, this central portion of the mountain-region covers 26,159 square miles, and is nearly equal to half the area of England without Wales. The mountain-tract within the Kölén range is calculated to occupy 4687 square miles; and the table-land of Jemtland, with the adjacent ridges and valleys, covers very nearly half the region, or 14,632 square miles. The tract intervening between this table-land and the hilly tract along the coast contains less than one-sixth of its surface, or 4509 square miles, and the hilly tract itself somewhat more than one-sixth, or 4972 square miles. A little more than 85 square miles are under cultivation, and 454 square miles are meadows and good pastures. This region is also rich in forest, and the quantity of timber exported is a little tar is also made.

The country to the east of this ridge and part of the mountain-system of Mount Sylfelen, and north of a straight line drawn from Söderen to the Gulf of Bothnia, is the most southern bay of Lake Siljan, until it meets the ridge of the Tiveden Mountains, resembles in its great features the countries which lie farther north, consisting of a
higher, lower, and lowest tract. The highest tract, whose greatest elevation is about 800 feet above the sea, is the most extensive: it stretches from the mountains to the western extremity of Lake Siljan, a distance of about 40 miles. North of that lake it extends much farther to the east, and here it occupies from west to east about 80 miles, but an arc, the whole width of the sea, and the sea a space 40 miles wide. The surface is less broken than that of the regions farther north, consisting chiefly of long and gentle swells, the summits of which form levels of considerable extent. A few hills, generally of these summits, but these are not steep, and they do not rise more than 300 or 400 feet above their base. These hills are numerous in the vicinity of the mountains, especially on the west of Lake Siljan, but they become rarer in the country farther east. And it is a few miles to a few valleys, and to the low grounds surrounding the lakes, where rye, barley, and especially oats, are cultivated, and some vegetables are grown. Domestic animals are reared, chiefly cattle, sheep, and goats. The goats are more numerous here than in any other district of Sweden. Nearly the whole tract is covered with forests, the produce of which finds a ready sale in the adjacent Region of the Mines.

Lake Siljan, which is situated near the southern border of the tract, is a very considerable lake: its length from north-west to south-east exceeds 25 miles, and for nearly 15 miles it is six miles wide: its surface is 555 feet above the sea-level. On the west and south it is surrounded by very numerous islands, along with level plains. So low and east the hills are much higher, but the declivities are usually gentle, and enclose narrow fertile valleys. In the district surrounding this beautiful lake agriculture is conducted on a larger scale than in the country to the east and north of the sea.

The eastern portion of this region, extending from the Gulf of Bothnia about 40 miles inland, is an inclined plain, which gradually rises from the sea to an elevation of 800 feet. The ascent is somewhat more rapid in its western part, and it is divided by a line running parallel to the sea, of which that on the shore rises in the space of 20 miles from the level of the sea to 300 feet, and farther inland in an equal distance from 300 to 800 feet. The surface of this tract is interspersed with numerous hills of moderate elevation and with lakes. Most of the hills have gentle declivities, but a few of them are steep. A plain of considerable width extends along the shores from 61° 40' N. lat. to the mouth of the Dalälven (69° 40'): this is the most northern part of Sweden in which wheat is grown. Barley and potatoes are most extensively cultivated; rye, oats, and peas are also grown. Sheep and cattle are very numerous, and there are also other domestic animals, as horses, sheep, and goats. This region is best suited to the north, containing a greater proportion of clay mixed with the gravel and sand.

According to a rough estimate founded on data taken from Forsell, the area of this region is thus divided:—The most northern part, between Lake Siljan and the tract to Sweden, comprehends 1220 square miles; and the extensive region, which is more than 800 feet above the sea-level, comprehends 6137 square miles. A tract of land west of the Tiveden range, at the base of the Sylliden mountains, is lower than 800 feet, and occupies about 870 square miles. The country surrounding Lake Siljan, which is on an average 600 feet above the sea, contains 1221 square miles. The lower portion along the Gulf of Bothnia has an average declivity of swells, and is equal to that tract which is more than 300 feet high and between which sinks lower. The cultivated ground probably does not exceed 100 square miles, but the meadows and rich pasture-grounds occupy more than four times that extent.

4. South of the region just described extends the Region of the Mines. It occupies the whole breadth of Sweden, extending from the boundary of Norway to the Gulf of Bothnia, and thus forming a continuous tract with the northern boundary is a straight line drawn from the great bend of the Glommen at Kongsvinger, through Lake Siljan to Söderhamm. Its southern boundary runs west of Lake Wenner, along 59° 30' lat.; east of that lake it begins at 59° 30' lat., which is the southern boundary of this tract, and thence to the western extremity of Lake Hielmaren, and thence north-east to the most southern bend of the Dalälven, which river forms the boundary from that place to its mouth. The area is 16,000 square miles, or twice that of Wales. The Tiveden ridge crosses it nearly in the middle; and its elevation in these parts probably never falls below 1000 feet above the sea. This is the greatest elevation of the region, whose slope on the west of the range is directed towards the south, and on the east towards the Gulf of Bothnia. The banks of this slope are less than 300 feet above the sea. The country lying east of the Tiveden ridge slopes to the south in the southern and to the east in the northern districts. Its elevation above the sea is never less than 300 feet, except on the western shore of the Gulf of Bothnia, the Söderhamm to the mouth of the Dalälven. On the west side of the great southern bend of the last-mentioned river, and only a few miles from it, is a tract of considerable extent, which rises from the sea to 1000 feet above it, and which is exceedingly uneven, and it is covered with a succession of low unconnected hills, the slopes of which are very gentle, and generally covered with wood. The low grounds between the hills are of small extent, and the best part is generally occupied by a small lake or by a marshy tract. These small lakes and marshes are almost countless. Some of these lakes however are several miles in length. In the country west of the Tiveden range the lakes lie from north to south, and their largest are situated in the lake district, which is situated about 10 miles from Lake Siljan. The lakes Gewen, Mellen, and Ofre, each of which is above 20 miles long, but they seldom exceed two miles in width. The lakes to the east of the Tiveden ridge have a more irregular shape, and some of them are more than 100 miles in extent. The districts east of the Tiveden range are more cultivated, and the trees are of small extent. Oats are most extensively cultivated, and next to them are barley and wheat. Potatoes and peas are grown to a considerable extent. In the southern districts there are good pastures; and cattle, sheep, hares, and hogs are numerous in the southern districts.

The soil is inferior to that of many districts farther north, a larger portion of it is under cultivation than in the more northern provinces. The arable lands occupy about 400 square miles, or one-fortieth of the area. But the meadows, or enclosed pasture-grounds, hardly extend over more than 800 square miles. Thus only three-fourths of the surface of the soil is cultivated, and the rest is covered with trees, few of which produce timber, but they are valuable for the working of mines.

5. To the south-east of the Region of the Mines is the Central Agricultural Region, which comprehends the greatest part of the country from the Gulf of Bothnia to the Söderharn, Sweden, comprehends 1220 square miles; and the extensive region, which is more than 800 feet above the sea-level, comprehends 6137 square miles. A tract of land west of the Tiveden range, at the base of the Sylliden mountains, is lower than 800 feet, and occupies about 870 square miles. The country surrounding Lake Siljan, which is on an average 600 feet above the sea, contains 1221 square miles. The lower portion along the Gulf of Bothnia has an average declivity of swells, and is equal to that tract which is more than 300 feet high and between which sinks lower. The cultivated ground probably does not exceed 100 square miles, but the meadows and rich pasture-grounds occupy more than four times that extent.

That portion of the region which is north of lake Mälaren is nearly a level plain, interspersed with a few isolated and low hills, which occur at great distances from one another, and are more numerous in the northern and southern districts. In the southern districts there are some sandy hills, which run from east to west, and extend several miles. The country south of the lakes Mälaren and Hjelmaren, which is the northern part of this region, is interspersed with rocks. In those districts there are numerous lakes, which are not common in the country north of the lakes. Though the substratum of this region is rocky, the surface consists of sand, with which a consider-
one-seventeenth part of the area. If we add to this the area occupied by meadows and pastures, which amounts to 924 square miles, we find that more than one-seventh of the surface is devoted to the agricultural interests, the principal object of cultivation, and the produce is greater than that of all other grains taken together. Next to rye are barley and wheat; very little oats are grown, but potatoes and turnips are cultivated. Cattle and sheep, horses and hogs, are numerous.

South of the central agricultural region is the Plain of Linköping, which is separated from the central region by a more elevated tract, which surrounds the northern extremity of Lake Motala and has a breadth of about 16 miles, until it approaches the bay of Bräviken, when it contracts to a ridge hardly two miles wide. This narrow ridge, which is called Kolomoren, runs along the northern shore of Lake Motala and is about 1 mile in width. The general elevation of this tract is between 300 and 400 feet above the sea-level, but in the centre it rises much higher. The highest point, or, extending from the extremity of the region, is more than 800 feet above the sea. It surrounds the southern extremity of Lake Vettern, and extends to it southward for about 30 miles. This, the most elevated part of the table-land, is a ridge of higher ground, which may be considered as a continuation of the Tiveden ridge. This last-mentioned ridge, which is between 500 and 600 feet high where it separates the basins of the lakes Wenern and Vettern, continues southward along the western banks of Lake Vettern, preserving nearly the same elevation, but interrupted in some places by short depressions; but as it approaches the southern extremity of the lake it rises higher, and where it meets the table-land it has an elevation of more than 900 feet. Nearly 10 miles south of the lake there rises on this ridge a high hill, called Taberg, whose summit is 1100 feet above the surface, and has attracted the attention of geologists, as about three-fourths of it consists of pure ironstone. From this summer hill the ridge runs westward towards the centre of the higher portion of the region, it again rises to more than 1100 feet above the sea, and divides into two branches, of which one runs west and the other south-west; both of these ridges are about 1 mile in breadth. The general elevation of this ridge may be about 1000 feet above the sea, and less than 200 feet above the general level of the country. This is the highest ground in Sweden south of 6° 30' N. lat. The surface of the table-land varies greatly. There are many tracts of considerable extent, which are flat: plains: other districts have a broken surface. On the higher part of the table-land there are only a few lakes, but in its western district, and still more its southern, they are very numerous, and some of them are at a considerable elevation above the sea-level. This part of Sweden is called the sea-land. As the table-land is not protected by a range of mountains against the winds, it suffers much from gales, and its climate is severer than that of the adjacent lower districts. The winter lasts seven months; the cold is very intense for three months, and a great quantity of snow falls. This last circumstance however must be considered advantageous, as it gives to the dry soil that degree of moisture which enables it to maintain vegetation all winter. The greater part of this district is cultivated; the table-land rests is composed of gneiss, and as these rocks when disintegrated form the worst kind of soil, this region is of very moderate fertility. Tracts many miles in length and width are covered with sand, on which nothing grows except common heath, and some species of hardy vegetation. Where the soil is mixed with a little vegetable mould, the country is covered with wood, especially birch; but the trees have not a vigorous growth, except in the more hilly tracts which lie along the outer borders of the table-land. In those districts whose surface is uneven, there are tracts with a better soil, which are cultivated with great care, but they hardly pay for the labour bestowed on them. The best tracts are those which surround the lakes. Wheat is grown in a few places, but they are of small extent, and the produce is scanty, yielding only from three to four times the seed. Rye yields about four times the seed, and is rather extensively cultivated. The principal grain raised on the higher part of the table-land is oats, and on the lower part barley. Potatoes are much cultivated on the higher part. The cattle, sheep, and hogs are rather of small size, and the wool of the sheep is very coarse. The meadows are bad, with the exception of some tracts along the lakes, and the pasture grounds in the woods have little grass. Though much has recently been done to extend cultivation to those tracts, which were formerly lying waste, that portion of the area of the table-land which produces food for the men of the country is yet much exceeded by that shaded by the forest, which makes up the one-nineteenth part of the whole; and of this extent only one-fifth, or little more than 30 square miles, produces corn and vegetables: the remainder consists of meadows and enclosed pastures.

6. The Marine Region of Småland, or the eastern declivity of the table-land of that name, extends opposite...
the island of Oland, from south to north, but it advances northward within five or six miles of the Gota Canal. Its length rather exceeds 140 miles, but the width is incon-
siderable, the widest parts of the island being but much exceed-
ing 12 miles, though towards the north it widens to
nearly 25 miles. Its area is about 2700 miles. The general
level rises mostly with a north-western slope from the sea
to 700 feet, near the borders of which it attains an elevation of 300 feet above the sea-level. The surface
presents great varieties. The southern districts, or about one-
third, are rather undulating than hilly; and between
the slight elevations there are extensive flats. The soil of this
tract is fertile and of good quality, and a large part is covered
greater part is covered with woods, consisting mostly of fir
and birch, but there are few timber-trees. The northern
districts, or rather more than two-thirds of the whole, have
a much more broken surface, presenting a succession of
hills, valleys, and small plains. The hills are generally
steep, and enclose narrow valleys. Some of the most ex-
tensive lower tracts are filled with lakes. The soil contains
a greater mixture of clay or vegetable mould than farther
to the south, but as in many places it has little depth, and
in other parts is very stony, these districts are not much
better adapted for cultivation than the southern. Never-
thelass a comparatively large portion of the surface is under
the plough. But most of the valleys and declivities of the
higher districts are now covered with crops cultivated
rather than with pasture-ground. Timber is the principal article of export; tar and pitch are also
exported. Rye and barley are extensively cultivated, and
generally yield five times the seed. Oats are not much
grown, and wheat only in a few more favoured tracts.
Potatoes however are much planted, and this branch of agricul-
ture is continually increasing. Domestic animals of every
description, with the exception of goats, are abundant,
which is shown by the extent of the meadows and pasture-
grounds, and the large quantities of hay and corn produced.
One-seventh of the region, whilst the area of the part under
cultivation does not exceed 90 square miles, or only one-
thirteenth part.
The island of Oland, which occupies this region, may be considered as an appendage of it. This island lies
parallel to the coast, and is very long, but comparatively
narrow. The length somewhat exceeds 80 miles; the width
varies between eight and two miles, and on an average may
be considered as the same 80 miles, which gives an area of 400 square miles. The surface consists of a
waste, which is never more than 200 feet above the sea-level, and
generally only half as much. This swell is composed of chok, which is covered with a layer of earth, and its fer-
tility is such that it is the most productive part of the
region. One-seventh of the area is covered with woods. The greatest portion of the islands is used as pasture-ground, and the ponies are dis-
tinguished by their strength: they are exported in
great numbers.
Rye and barley are extensively cultivated, and
also other kinds of grain to a small amount.
9. The Maritime Region of Blekinge extends over the
south-eastern coast of Sweden from about 14° 30' to 16° E.
long., somewhat more than 50 miles in length. Its width may
be estimated at 15 miles. The surface does not exceed 770
square miles. This is the most broken portion of the Swedish
coast. The rocky masses of the table-land of Småland divided
into small ridges by numerous watercourses, which run in
deep and narrow valleys, advance within a short distance from
the shores, where they terminate in hills from 200 to 300 feet
high. East of the town of Carlskamn these rocky
masses come close up to the sea, so as not to leave any level
space for a road. The small rivers, descending from an ele-
vated tract more than 400 feet, and falling into the sea at a distance of only 15 miles from it, are
extremely rapid, and form many small and beautiful
cataracts. The level grounds are much less extensive in
this region than in any other part of Sweden, but they possess
some degree of fertility, being capable of adap-
vated with care, and the crops return in general six times
the seed, and in some places more. Wheat is much grown,
though the cultivation of rye is ten times more extensive;
but the cultivation of Sweden, the southern part of the Central Agricultural Region,
Barley and potatoes are also much cultivated. The mea-
dows in the valleys along the banks of the river, though
not extensive, yield, about the middle of May, a crop of excellent pastures, though their summits are
almost destitute of such vegetation as is adapted for use-
ful purposes. In some parts they are covered with wood,
especially birch and fir; but these trees have usually a
considerable growth of underwood, and from these
and among them some beech and oak. The rearing of
cattle and hogs constitutes one of the principal objects
of domestic economy, and much choice is made. The propor-
tion of the area which produces food for men is much larger
than that which produces pastures, and the surface, or about 45 square miles are cultivated: the extent of
meadow-grounds and enclosed pastures is double that
amount.
10. The Plain of Scania occupies all the peninsula
which constitutes the most southern portion of Sweden, between
the Sound on the west and the Baltic on the south and east.
A straight line drawn from the innermost recess of the Skiel-
derick, a large and open bay of the Kattegat, on the west,
to the peninsula of Sölve is the best sea route. The coast, may be con-
idered as marking tolerably well its northern boundary,
where it joins the table-land of Småland and the maritime
regions of Blekinge and of Halland. It extends from south
to north, the distance between the two extremities being
60 miles, being greater towards the north than along the
south coast: it hardly exceeds 3000 square miles, so that it is
only about 200 square miles larger than the county of
Lincoln, to which it bears some resemblance in its surface,
flats, and marshes. Scania, which is now a county, lies
in length by a low broad swell of high ground, which
begins at the most north-western point of the plain with
Cape Kullen, a moderately elevated headland at the northern
opening of the Oresund. From this point it extends in a
south-easterly direction, and is bounded on the east by
the Baltic

Agriculture:

Forest:

Rural Economy:

Cattle and Hogs:

Pastures:

Coastline:
duction of food, and is used only at certain seasons as sheep-walks. The cultivated fields are calculated to cover an area of 72 square miles, and the enclosed pasture-grounds and meadows 680 square miles.

11. The Maritime Region of Halland, which extends along the eastern shores of the Cattegat, is the western de-
civity of the table-land of Småland. It is bounded by the bay of Vik, whence it extends northward to the mouth of the Göta Elf, which two parts are nearly 112 miles distant from one another; but its width is inconsiderable, being in general about 15 miles. The extent of this region is interrupted by a tract of high land, which projects from the south-western corner of the table-land of Småland, and running westward, terminates in the peninsula of Hallands-Höga Viking, which is a continuation of the Bailey of Laholm on the north, close to the sea. This high land rises in general from 400 to 500 feet above the sea-level, and the highest part resembles the table-land, being mostly a level, but frequently interspersed with hills. The soil is sandy, partly covered with heath, and partly wooded. In some places there are swamps. Beech is abundant, and there are many large trees. The width of this elevated tract is about eight miles. To the north it lies the least level portion of the region, with the exception of the bay of Wenern, containing the sea. In these parts the slope of the table-land of Småland is more regular than that on the south and east. It descends with a continuous declivity, which is only broken by the bay of Vik. The undulating layers of earth between its base and the shores a tract of undulating ground about 8 miles wide. The soil, though inferior to that of the plain of Scania, and even to that of the maritime region of Blekinge, is generally more mediocrity, yielding between four and five tons of the general crop of rye and barley: it is seldom strong enough for wheat or peas, but it produces abun-
dant crops of potatoes. The slopes of the hills at the back of the undulating plain make good sheep-walks. The undulating plain of this region, from Warberg to the mouth of the Göta Elf, has a more continuous broken surface. Rocky hills of moderate elevation extend from the table-land near the shores of the sea, and between them are wide val-
leys, which are partly filled with long lakes, which lie in the direction of the general slope of the surface, which is to the south-west. Though a few of the hills are without vegetation, most of them are covered with stunted trees or with grass. On the banks of the lakes there are large meadows; and the pasture-
grounds on the hills, though not rich, are very exten-
sive. Large numbers of sheep and cattle are kept, and also many horses. Only a small portion of this tract is under cultivation, and it produces chiefly rye and barley. The cultivated portion of the whole region has been estimated at about 26 miles; and the area of the cultivated pasture-grounds occupy 224 square miles. More than one-
sixth of the whole country is employed in producing food for man.

12. The Southern Basin of Lake Wenern extends over the wide isthmus which separates the two lakes of Wenern and Wettern. The parallel of 58° may be considered as its southern and that of 59° the Tifveden ridge as its northern boundary; on the west it borders on the Göta Elf. The basin of lake Wenern is limited on the east and west. On the east the Tifveden ridge, running parallel to its eastern banks, is only about 8 or 9 miles distant. On the west the stony masses of the rocky region advance still nearer to the border of the lake. But towards the south it approaches the isthmus of Scania. The surface of this tract may be divided into the wooded dis-

13. The Rocky Region extends over the north-western portion of Southern Sweden, occupying the whole tract be-
tween the course of the Göta Elf on the west and the Skagerak on the north, as far as 58° lat. and the boun-
dary line of Norway. From south to north it measures nearly ninety miles; but the width, which at the southern extremity hardly exceeds ten miles, increases as we proceed northward, so that at the northern boundary it is rather more than 50 miles in the width. This tract is entirely covered with heath. Rye and barley are extensively grown, but not much wheat or rye. Wheat and oats are grown in six times, and potatoes are grown in a great extent, and yield ten times the seed. The meadows and pasture-grounds are less valuable than in most of the other provinces of Sweden, except on the borders of the lakes. The cultivated ground is stated to occupy only one-seventh of the area, or 532 square miles, and the meadows and en-
closed pastures about one-seventh part, or 563 square miles. That part of the surface therefore which is regularly em-
ployed in producing human food considerably exceeds one-
fifth of the whole region.

14. The Southern Region of Småland extends over the western portion of that province, which extends to the se-

15. The Northern Region of Småland occupies the remaining portion of the province. The surface is elevated, and exposed to the influence of the cold winds of the north. The cultivated portion of the region is only 26 miles.
Wennersborg to the north of 59°. But it is not of great extent, as it only reaches a distance of six or eight miles from the coast, whereas the Baltic coast is from 21 to 27. towards the south the sea is very even and slightly elevated above the level of the lake, of which it formerly seems to have constituted a portion, as the whole is covered with a rich alluvium. Towards the north however the low elevations of the land, which lie near the surface of the lake, are the best meadows which are found there, on which the lake is only one-fifth of the length of the other lakes, and which has already been mentioned. We shall here notice those which facilitate the commercial intercourse of the country.

The largest lake is the Wenner, which is traversed by four N.-S. and two E.-W. lakes, and is about 10,130 square miles. The two headlands projecting from the northern and southern shores divide it into two unequal parts, of which the western and smaller is designated by the name of Lake Dalbo. Lake Dalbo extends from south to north about 55 miles, and from east to west about 36 miles. The eastern half of the lake is connected with Lake Wenner is about 15 miles wide, but numerous small rocky islands lie across the strait, leaving only narrow passages, which renders the navigation dangerous, on account of the gales, which are not unusual on the lakes. Only four of these passages have depth enough for the vessels that are used on the lake. Lake Wenner is 60 miles long from south to north, and 20 miles wide where broadest. A large part of the shore is wooded, but there are some cultivated parts, and the north end of the lake is separated from Sweden by Lake Dalbo. The two lakes cover a surface exceeding 2000 square miles, and receive the waters of numerous rivers. Those which fall into it from the south have a long course and are of considerable extent, while those which flow from other lakes of considerable extent, and contain much water. The largest river is the Klar Elf.

The Klar Elf originates in that elevated mountain-range which extends along the boundary-line between Sweden and Norway, south of the Syllsellen. Several small rivers, the outlets of lakes, fall into Lake Fännund, which is 2200 feet above the sea, and is situated within Norway. The river issuing from its south-western extremity is called Thysself, and runs south-west. This river joins the Klar Elf, which flows from the north, and are 20 miles wide where broadest. A large part of the shore is wooded, but there are some cultivated parts, and the north end of the lake is separated from Sweden by Lake Dalbo. The two lakes cover a surface exceeding 2000 square miles, and receive the waters of numerous rivers. Those which fall into it from the south have a long course and are of considerable extent, while those which flow from other lakes of considerable extent, and contain much water. The largest river is the Klar Elf.

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The waters of Lake Wenner are carried by the Kattegat by the Gtta-Elf, which runs more than 50 miles, to the west of south. It has a great volume of water, and about 14 miles from its mouth, near Kongel, divides into two arms, which enclose the large island of Hisingen. In its natural state the river was rendered unfit for navigation by several cataracts, which occur in the first 18 miles of its course, within which distance the river descends about 130 feet; but art has supplied this deficiency. The first cataract is about 70 feet high, and occurs close below the town of Lake Wenner, called Res, and extends east south east, joining the river more than two miles below the cataract. It is about two miles long. About four miles below the place where the Charles Canal joins the river, the rapids of Trolhättan commence, which occupy about five miles, and are about 20 feet high. The river, which by which they are now avoided, is cut through the rock, and is considered one of the most perfect works of its kind; it is called the Trolhättan Canal. A fall near Akersund, more than 300 feet high, is avoided by a short cut and a lock. The last cataract occurs at Lake Rännan, where the river is nearly 10 feet high, and is likewise avoided by a single lock. A few rapids occur lower.
down, especially at Hanstorp, two miles below Lilla Edet but they present no great obstacles to navigation. Thus the Göta Elf has been rendered navigable for vessels not drawing more than six feet of water; and the whole country along the banks of the river is still more easily traversed by means of the numerous canals. The Trollhättan Canal, which was finished in 1800, is about two miles long, and has eight locks.

Lake Vänern, which occupies the centre of Southern Sweden, extends from south to north about 80 miles, and its width is about 10 miles. The surface is about 900 square miles. It is on the highest general level of Sweden, between 57° and 58° N. lat., and the surface is 288 feet above sea-level, which may or may not be considered the highest point east and west of the country is several feet lower. It is surrounded by rocks and hills, except on the north-east, where for nearly 20 miles it is contiguous to the plain of Linköping, and the shores rise only a few feet above its level. In these parts it also receives the only river that enters it; for all the other streams that flow into it are only torrents. It partakes of the nature of an alpine lake, being in one place more than 70 fathoms deep. It is subject to heavy gales. The river Motals issues from this lake on the north-east, and after having traversed the plain of Linköping, carries its waters to the Baltic. The distance between the eastern shores of the lake and the Baltic in a straight line is about 64 miles. The course of the river, notwithstanding its rapidity, is of great length. The valay of Lake Vänern, which is nearly 25 miles wide, is the site of the Gulf of Vänern, which enters about 24 miles inland. The Motala flows first eastward, traversing at the distance of three miles from its efflux, Lake Boren, which is 237 feet above sea-level, and at the distance of about 10 miles from the place where it leaves Lake Boren it enters Lake Roxen, which is 101 feet above the sea, and 167 feet below the level of Lake Wettern. The river leaves Lake Roxen at its eastern extremity, and changing its direction runs west by north seven miles to Lake Glan, which is only 68 feet above the sea-level. Leaving this lake it runs again to the east, and after a course of about five miles it enters the Briviken at the town of Norrköping. The whole course of the river, exclusive of the lakes, is only about 56 miles, and its descent 288 feet, or 114 feet per mile. The channels by which the lakes are connected with one another are too rapid for navigation.

The abundance of water on this line has been used for establishing the canal system which is called the Göta Navigation, from its crossing the southern part of Sweden, which is called Götalands. A canal has been made between the lakes Wenner and Wettern, which is called the Western Göta Canal. A narrow branch of Lake Vänern issues west by north along the Baltic, which is called the Eastern Göta Canal. The Western Göta Canal is about 20 miles long, exclusive of Lake Viken, which is the summit-level of the line, 296 feet above the sea-level, and 152 feet above Lake Wenner. As the descent to Lake Wenner is so great, this line has required 24 locks. Lake Wenner cannot supply so much water as is required for them, but to the north of it is Lake Unden, which is 87 feet higher, and discharges its waters into Lake Viken. The Eastern Göta Canal is about 64 miles long, inclusive of the lakes which it traverses, and which have been deepened to the necessary depth for the vessels: it extends along the banks of the Motala eastward to its efflux from Lake Roxen, which is on the southern boundary of Lake Vänern, and near to the mouth of the river Glan, which is about 86 feet above the sea; and enters the Baltic, where it forms a considerable inlet, called the Slite Baken, two miles below Söderkoping. The Eastern Göta Canal has 33 locks. The Göta Canal is 10 feet deep, 48 feet wide at the bottom, and 62 feet at the surface. These two canals were begun in 1810, and in 1830 the whole was finished, and the navigation opened. The width of Sweden near 55° 30’ N. lat. near which parallel the greater part of this coastline is situated is about 100 miles wide. Towards the north navigation through the Göta-Elf, the lakes Wenner and Wettern, and the two Göta Canals, does not exceed 260 miles.

In the parallel of the northern part of Lake Wenner, but much more to the east, is Lake Hielm, which extends about 33 miles from east to west, and is about two miles wide at both extremities; but it enlarges in the middle to eight miles. The surface is 78 feet above the sea-level, and it covers an area of about 150 square miles. It communicates by a canal with the river Arboga, which runs north of the lake, and falls into Lake Mälaren. This canal, called the Hilmar canal, begins on the northern bank of the lake, and is about seven miles long: it has eight locks, and raises the vessels two feet deep. The navigation is chiefly directed by short channels, which enclose islands. The number of the small islands is in some places very great. Hardly a clear sheet of water of a mile square can be found. From the town of Stockholm to the Baltic, a little under 100 miles by land, is the greatest distance; but by the Canals, which are situated on both sides of the road, it is reduced to about 60 miles. The navigation is nearly on a level with the Baltic.

The advantages of the navigation on Lake Mälaren have been increased by the Södertelge and Strömsholms canals. The Södertelge canal is cut about two miles long, which units one of the arms of Lake Mälaren, which penetrates several miles inland to the south, with a deep inlet of the Baltic, called the Järme (Yarno) Fjord. By means of this canal vessels may be carried from Stockholm to the Baltic, without passing through the long channels that lead to Stockholm and thence to the open sea. This canal is about 18 miles west-south-west of Stockholm. The Strömsholms canal, which extends from its mouth, which is about 30 miles from the Baltic, to the town of Stockholm, which is 327 feet above sea-level. The distance, including the lakes Barken and Amlandingen, which together occupy about 50 square miles, is only 13 miles, which run above 300 miles, descending from the higher portion of the Kölen range, and falling into the Gulf of Bothnia. Nearly all of them run from the north-west to south-east. The largest is the Dal-Eльf. [Dali-Elf.] Further north is the Liionsan or Liussan Elf, whose most remote branches originate on the southern declivity of Mount Sysiifelsen. Its upper course is in the elevated valley of Herjesalen, and is very rapid. East of the river, which has continued to run south-east, is a chain of small lakes, which are about 7 miles long, and 2 miles wide. These lakes have been connected and turned into one great lake, which extends from the eastern extremity of the lake to the Baltic, and the length of this considerable lake is about 5400 feet, and its width 5400 feet. The lower part of the lake is much narrower, and has a width of about 500 feet. Into this lake, which is 500 feet wide, and 20 miles long, it is entered by several channels, which extend into the Baltic. These are the most numerous small cataracts. In the lower country it often extends to the width of two or three miles, so as to resemble a lake. This river falls into the Gulf of Bothnia south of the town of Vänersborg. The river Järme or Jarmen, which extends from its mouth, which is about 30 miles from the Baltic, to the town of Stockholm. Further north the Gulf of Bothnia receives the Liungen Elf, the Indals Elf, and the Angerman Elf. [Angermanland, vol. ii., p. 18.] The rivers of Bothnia (vol. v., p. 255) are the Ume Elf, the Skellefes Elf, the Pites Elf, the Lules Elf, the Calix Elf, and the Tornes Elf.

Climate.—The difference in the climate of various places in Sweden is chiefly to be attributed to the difference of latitude and elevation above the sea-level. The most northern point of the country, about 7 degrees north of the Arctic Circle, is situated nearly 11 degrees to the south of it. A small portion of the country is so elevated that it is always covered with snow; and large tracts along the sea-coast are only a few feet above the sea. The elevation at which perpetual snow occurs is less we proceed farther north. Near 60° N. lat. it is about 5600 feet, at 61° N. lat. 5400 feet, at 62° N. lat. 5100 feet, at 64°, 4650 feet, and at 71° N. lat. 2300 feet above the sea. The table-land of Småland rises from 400 to 900 feet over sea-level, and is about 1100 feet. The inclined plain in the most northern district of Sweden rises near the boundary of Norway to 2000 feet above the sea. A part of Southern Sweden is also exposed to the influence of the Atlantic ocean, which has a direct effect on the climate in winter, and of moderating the heat in summer. The following tables give the result of meteorological observations continued for many years, at ten places, which are at considerable distances from one another, and at different levels above the sea.
On comparing the climate of Edinburgh and London with that of five towns in Sweden, it appears that the mean temperature of the summer is greater in three of the Swedish towns and in London in all of them than at Edinburgh. It is remarkable that the mean temperature of the summer of Weixil exceeds that of Edinburgh by more than 6 degrees; though Weixil is 500 feet above the sea, and nearly a degree nearer the north than Edinburgh. This is probably what is attributed to the dryness of the air on the table-land of Småland during the summer. But the difference of the mean temperature of the winter is 10 degrees in favour of Edinburgh. Göteborg lies nearly 2 degrees nearer the pole than Edinburgh, but the mean annual temperature does not differ from that of Edinburgh much more than half a degree, though that of the winter differs nearly 8 degrees. In the winter the prevalence of northern and north-eastern winds makes the inhabitants of Göteborg feel their northern situation, while during the three other seasons the temperature is raised by the prevailing south-western and western winds, the temperature of which has been increased by passing over the Atlantic. It is generally observed that the weather is much more inconstant and wet on the western shores of Sweden, along the Skagerack and the Cattegat, than on the eastern shores along the Baltic, but not so subject to great changes. A closer inspection of the table would induce us to think that the prevailing opinion of the climate of Sweden is not correct. The common opinion respecting the climate does not rest on continuous observation, but on single facts; and such facts would certainly lead us to think that the winters are very cold and the summers hot in Sweden. On the 20th of January, 1814, the thermometer at Stockholm sank to -25°, whilst at London and Edinburgh it never sinks to zero. On the 3rd of July, 1814, the thermometer at Stockholm was 90°, a degree of heat never experienced in the British Isles. But such extremes of cold and heat never last more than a few days.

### Table II. containing the Mean Temperature of five Places in Sweden, North of 60° N. lat.

<table>
<thead>
<tr>
<th>Months</th>
<th>50° 30' N. lat.</th>
<th>55° 30' N. lat.</th>
<th>60° 30' N. lat.</th>
<th>65° 30' N. lat.</th>
<th>70° 30' N. lat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>December</td>
<td>6 + 10°</td>
<td>5 + 12°</td>
<td>4 + 13°</td>
<td>3 + 15°</td>
<td>2 + 17°</td>
</tr>
<tr>
<td>January</td>
<td>5 + 15°</td>
<td>4 + 17°</td>
<td>3 + 19°</td>
<td>2 + 21°</td>
<td>1 + 23°</td>
</tr>
<tr>
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<td>2 + 22°</td>
<td>1 + 24°</td>
<td>0 + 26°</td>
<td>-1 + 28°</td>
</tr>
<tr>
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<td>1 + 27°</td>
<td>0 + 29°</td>
<td>-1 + 31°</td>
<td>-2 + 33°</td>
</tr>
<tr>
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<td>-1 + 34°</td>
<td>-2 + 36°</td>
<td>-3 + 38°</td>
<td>-4 + 40°</td>
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<td>-2 + 43°</td>
<td>-3 + 45°</td>
<td>-4 + 47°</td>
<td>-5 + 49°</td>
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<td>-3 + 52°</td>
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<td>-6 + 58°</td>
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<tr>
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<td>-10 + 101°</td>
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<tr>
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<td>-9 + 106°</td>
<td>-10 + 108°</td>
<td>-11 + 109°</td>
<td>-12 + 111°</td>
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</tbody>
</table>

The difference in the mean temperature of the summer in these five places lies within four degrees, though the most southern and the most northern are nearly eight degrees of latitude distant from one another, and the most distant of these are not more than 1000 feet above the sea-level. This fact is to be attributed to the long stay of the sun above the horizon in that season, which, at Enontekis, lasts more than three weeks. This circumstance together with the superior strength of these northern countries to cultivate a few plants which require a sudden winter, as which is soon and reapd within seven weeks. The winters however are extremely cold. Forsell observes that north of 61° the quicksilver frequently freezes, which indicates that the thermometer descends at least to about 0°. But the temperature increases all over Sweden most rapidly in the two months preceding the mean solstices, and we find that the difference between the mean temperature of April and June in the south generally amounts to twenty degrees, and in the northern somewhat more. In the British islands this difference does not amount to more than twelve degrees. On this fact is founded the observation, made by almost every traveller, that in Sweden there is hardly any spring; the hot summer almost immediately follows the cold winter. The same observation however might also be made respecting the winter following the summer, as the temperature decreases nearly in the same ratio in October and November.

The annual quantity of rain is not known for the northern provinces, nor for the districts in the interior of the peninsula. In the low country bordering on the Baltic it amounts to between 21 and 22 inches, which is a less quantity than at the mouth of the Gota. The amount at Stockholm is included in this account. The number of rainy days in the year is said to be 149 in the southern districts. The prevailing winds blow between south-west and north-west. The number of days on which the wind blows from south-west is 27; on 43 it comes from south. From the north the wind blows 13 days; from north-east 63 days, from east 14 days, from south-east 38, and from south 18 days. The number of days which are quite calm is 36 days. On the west coast of Sweden.

As to the effect of the climate on cultivation, it is observed that at Enontekis (69° 30' N. lat.) only barley and turnips succeed; and that in thirty years only nine crops have paid for the labour. Rice cannot be grown with advantage north of 66° N. lat.; and so far also the cultivation of hemp extends. Oats cease to ripen north of 64°, and up to this latitude wheat is cultivated in a few spots, but in general observation growing with advantage north of 62° N. lat. Flax is grown near Stockholm as far north as 61° 15'. Oil-seed rape is not ripen to north of 60° 30'. Tobacco rarely succeeds north of 61°. Potatoes are cultivated as far as 66° N. lat., but cabbages only to 64° N. lat. Hops grow as far as 62° N. lat. for general observation ripening with advantage north of 66° N. lat. But other fruit-trees rarely beyond 60° N. lat. In the plain of Scania mulberry-trees, chestnut-trees, and walnut-trees are planted, and the fruit ripens.

The pines, fir, and birch extend to the most northern parts of Sweden; and near 65° N. lat. there are fine trees. Alders are found up to 63°, ash and willows to 62°, and elm and lime trees to 61° N. lat. The oak-tree grows wild north of 57° and so far it forms forests; but farther north only single beech-trees occur.

Pine-trees cease to grow at an elevation of 3000 feet below the snow-line; and lakes which approach nearer to the snow-line do not contain the Salmo trutta and the Salmo larta-etus. Bears are not met with above 3000 feet; and at that height barley ceases to ripen. The few families which live nearer the snow-line live on the produce of their herds and of wild flocks. But the most north of the country the permanent dwelling nearer than 2500 feet to the snow-line. Firs are only found at 2600 feet under the snow-line, but full-grown birch within 1800 feet. In the lakes which occur at such an elevation only the Salmo alpinus is found. Some bears are seen on the high birch ground at the level of the snow-line; and so far the Arctic bramble (Rubus arcticus) is found: but above them trees and bushes cease to grow, and the mountains are covered with brown plants and lichens. The Laplanders advance with their reindeer in summer to 700 feet below the snow-line.
Agriculture and Productions.—The climate and soil are less favourable to the growth of grain in Sweden than in most other parts of Europe. It is stated that in seven years one year occurs in which the crops entirely fail; that in three the produce is indifferent, and in three rather plentiful. For this reason the great Professor de Breyne long ago urged the government to attempt a new system. Formerly full one-fourth of the grain was required for home consumption, and considerable quantities were imported. Between 1777 and 1790 the quantity imported amounted to nearly 400,000 quarters; and even between 1810 and 1815 to 150,000. The great disproportion between the produce and the consumption has so long been a subject of great anxiety to the government as to lead them to make every effort to extend cultivation, which has been accomplished by settling such portion of the landed property of the crown which seemed to be least adapted to the purpose, and by causing the inhabitants to build their dwellings in the centre of the pieces of ground which had fallen to their share in the new distribution of the lands. When the agriculturists lived in villages, the land was divided among the proprietors, so that each of them possessed a long narrow piece of ground, the flattest extremity of which was frequently two or three miles from the dwelling of the farmer. The fields which were at such a distance were of course neglected, though the soil was not inferior to that of the fields near his home. Government induced and partly obliged the farmers to divide these fields, so as to form more compact estates, in the middle of which the premises of the farmers were erected. This change, more than any other, has led to the extension of large branches of agriculture, so as to supply for its consumption. The principal objects of cultivation are wheat, rye, barley, oats, mixed grain, and peas. According to the estimates of Forsell, wheat yields 4½, rye 5½, barley not quite 5, oats 4½, mixed grain 4, and peas 4½ times its culture. The amount of potatoes has in like manner increased. In 1803 only about 200,000 quarters of potatoes were grown, but in 1828 the potato crop was nearly 1,800,000 quarters.

Other objects of cultivation are hemp, flax, and tobacco; but sugar, and curare roots are also grown; and hops and malted. Nearly all the kitchen vegetables grown in England are cultivated in the southern provinces of Sweden, and most of them with tolerable success. Cherries, apples, and pears are abundant only in the southern districts; cranberries and other berries abound in the northern districts.

The forests are very large, sometimes extending 80 miles in length, with a width exceeding 25 miles, as the great forest which covers the mountains between the table-land of Jutland and Småland. The wood-forests of the north part of the northern countries (north of 64° N. lat.) are destitute of trees. Nevertheless the woods cover more than one-fourth of the surface, or 48,500 square miles; but they contain nothing which can be used for the purposes of agriculture; nearly all the parts the soil does not favour their growth, and only small trees occur, and at the distance of many feet from each other: the bushes and underwood in many places occupy the intervals, and in other places there is no underwood. Accordingly the export of timber, though considerable, is not in proportion to the immense extent of the woods. But these forests supply firewood, of which a great quantity is consumed, as Sweden has no coal. Large quantities come from the sea, and the mines, and by the manufactories. In some parts, especially towards the north, tar and pitch are extracted, chiefly from the roots of pine-trees, and are minor articles of export. Several kinds of coniferous trees and birch compose the greater part of these forests. Oak and beech form forests of small extent, but only in the southern districts. The immense tracts of country which are still uninhabitable, are generally used as pasture-ground, though it is of a very indifferent description; the domestic animals are at this season from five to six months in the year on the pasture; and their number is consequently limited by the extent of the meadows. Many tracts, at present used as meadows, could be cultivated, but it is found more advantageous to use them for meadow purposes than to change them into fields. As the vegetation is very indiff erent, the animals are small, especially the horses. Cattle and sheep are the most numerous, but the former are of small size, and the wool of the sheep is coarse. Some attempts have been made in Scania to cross the sheep with merinos. In the northern districts (north of 64°) reindeer are kept by the Laplanders, who bring them in summer to the most elevated parts of the Kölen range, where they feed on the reindeer moss (Lichen Islandicus), and in summer they pasture them on the low tracts near the Gulf of Bothnia. There are numerous, especially in the northern parts, but some of the larger size begin to be scarce, as bears and beavers. A few wild reindeer are still found in some places. Wolves, lynxes, gluttons, foxes, hares, squirrels, martens, and others are found common. Lemmings are sometimes brought by the inhabitants of the Kölen Mountains, and lay waste the low country. Elk and deer are found in some of the large forests. The largest of the wild birds are eagles, capercaille, black grouse, and woodcocks. Notes of sea-birds, the gannet, are common. Formerly large shoals of herrings came to the Kattegat, and in the latter half of the last century there was a very extensive fishery on the west coast of Sweden, but it has dwindled away, as the herrings no longer appear on that coast. It is stated that 85 different kinds of salt and fresh-water fish are brought to the markets of Göteborg, among which the turbot is common. There are also oysters and lobsters. The balery in the Baltic gives subsistence to a great number of families. A smaller kind of herring, called Strömings, is caught in the summer, along the whole extent of the east coast, from the Quarkan to the peninsula of Scania. This fish is very numerous, and is prepared in different ways: it is rarely exported, but forms the staple article of diet in the districts; it is caught abundantly in almost all the rivers. The Salmo thymallus and the Salmo lavaretus abound in the lakes.

Sweden is rich in minerals. Gold is found on the table-land of Småland, at Adefors, and was worked to the commencement of the present century. Silver, copper, galena, lead, cobalt, and copper-mines are of small extent, and the expenses of working the mines so great, that it has been abandoned. Silver is worked at Sala, in Westers Län, and at some other places, and in Falu Län; but the produce amounts only to about 2,000 pounds, of which the mines of Sala alone yield 2,500 marks. The expenses of working these mines are so great, that, according to Forsell, some disposition has lately been shown to abandon them. Copper is more abundant. The annual produce of the coppers-mines amounts to nearly 1000 marks. The richest mines are those at Falun, in Falu Län, which annually produce 682 tons: next to them are those of Otvi-däberg in Linköping Län, with an annual produce of 178 tons. Other copper-mines are at Boda, Örekils Las, Ovstrand near Mount Arekusa, and in Orebro near Hokanbo, and at a few other places; but their produce is small. The lead-mines, which are worked in Westera, and in Falu, produce annually about 44 tons. Iron-ore is not found in great quantities in Sweden, but in one part where it is not worked more or less, with the exception of the plain of Scania, where it seems that no iron-ore exists. The richest iron-mines are worked in that part of Småland, near the town of Kiolen, which is the lowest part of the region of the mines. But there are other places which contain inexhaustible layers of iron-ore, which cannot be worked on account of the access to them being difficult, or their being situated in a country destitute of fuel. This is the case with the mountains near Gällivare in Pite Län, which are composed entirely of iron-ore, containing from 70 to 80 per cent. of metal, and which could furnish the whole world with iron for many centuries; but they are far from the coast, and the inhabitants are destitute of fuel. The large mass of iron-ore in the Taberg, on the table-land of Smaliand, contains only 25 per cent. of metal, and it is too poor to be worked alone, though the metal is of good quality. The best iron is obtained from the mines of Dannemora in Uppland Län, which is well adapted for making steel. Nearly the whole of the produce, amounting annually to more than 3000 tons, goes to Eng-land, where it is called Orkengrund iron, being shipped at the town of Örebro, and also at Stockholm. Copper is produced in Carlstäd, Orebro, Gelle, Falu, and Weste-ras. The iron goes from Carlstäd to Göteborg, but from the other provinces to Stockholm, and from these two places it is sent to foreign countries. The annual produce of all the iron-mines of the kingdom was 2,000 tons, of which 300 were bar-iron. In Orebro Län are rich mines of cobalt, which yield annually more than 600 tons; others are found in Calmar and Nyköping Län, but their produce is not great, as all the cobalt-mines of the kingdom do not produce...
than 730 tons. At some places alum and vitriol are obtained, but only in small quantities. Coal on an inferior kind, called hag, is worked near Cape Kullen in Scania; but only to a small amount, as these mines are near the sea, where English coal of a superior quality may be obtained nearly for the same price. Porphyry is got at Eftvedal, in the upper valley of the Dalälven, south-west of Lake Siljan, and marble in the Kolmarden ridge, north of Norrköping, and in a few other places.

**Inhabitants.**—The bulk of the population are Swedes, a nation of Teutonic origin, and resembling the inhabitants of Poland in general, except that they are of a somewhat more slender make and fairer. They are distinguished by their predilection for scientific researches and a spirit of enterprise and activity. Besides the Swedes, there is a small number of Finns and Lapps, and the last two are not numerous in the valleys of the Torne Eif, near the boundary of Russia, and excel in the rearing of cattle and the management of flocks. There are some families of Finns more to the south, especially in the western country near the boundary-line of Norway, south of 61° N. lat., to which place they were transplanted more than 200 years ago by Charles IX. They rarely intermarry with the Swedes, and they preserve their habits and language.

The Lapps are generally a possession of all Lappland [Laplant], but many Swedes and Fins have settled among them. They call themselves Sami, and their country Samiland. Though their language proves that they are only a branch of the Finnish nations, they distinguish their own from the former by their body and their mode of life. Their stature is short, varying in general between four and five feet; which seems to be the effect of the cold, to which they are exposed in winter in their miserable huts: for in the richer families, who have more comforts and protection for themselves better from the severity of the weather, there are persons who measure five feet six inches. Their complexion is a dirty yellow, which is partly to be attributed to the smoky huts in which they pass the winter. Their face is generally smooth and their hair short; the hair is rather bleached; the eyes are brown, narrow, and lengthened; and the mouth small. They are not strong, but they are very active, and of a cheerful disposition. A few families obtain their livelihood by fishing in the lakes and rivers, but the greater number live on the produce of their herds of reindeer, which supply the Lapps with food, dress, and articles of exchange. They live on the milk and flesh of the reindeer, convert their skins into dresses, and sell their smoked flesh, and especially their tongues, which are considered a great delicacy. These animals are also used in drawing the sledges. The Lapps live only in the country north of 64° N. lat.; in winter they come with their herds to the lower country near the Gulf of Bothnia, and in summer they migrate to the Kullen Mountains. There are a few families south of 64° N. lat., who live the whole year near the mountains which are connected with Mount Areskuta and Mount Syllfellen, and in summer remove to the higher part of the range. It is stated that the whole number of Lapps in Sweden does not exceed 7000 individuals.

**Population.**—The population of Sweden in 1839 was 3,109,772, so that there were about 18 persons to every square mile. But the increase of the population, especially of late years, has been so great that Sweden must be considered as a newly settled country, when it is considered that the whole increase is the effect either of the extension or the improvement of agriculture. The following table shows this increase for the last 85 years:

<table>
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<tr>
<th>Year</th>
<th>Population</th>
<th>Increase</th>
<th>Annual Increase</th>
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<td>1751</td>
<td>1,795,727</td>
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<tr>
<td>1760</td>
<td>1,893,246</td>
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<tr>
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<td>1850</td>
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<td>226,910</td>
<td>7.91</td>
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**Population of the different Districts of Sweden in 1829.**

<table>
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<tr>
<th>Names of the Districts</th>
<th>Extent in square miles</th>
<th>Population in 1829</th>
<th>Number of Persons per square mile</th>
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<td>City of Stockholm</td>
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<td>93,855</td>
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<td>Stockholm Lin</td>
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<td>Westerås</td>
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<td>Nyköping</td>
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<td>Linköping</td>
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<td>Jönköping</td>
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<td>Wexiö</td>
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<td>Gefle</td>
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<tr>
<td>Östersund</td>
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<tr>
<td>Umea</td>
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<tr>
<td>Pitea</td>
<td>46,422</td>
<td></td>
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</tbody>
</table>

**Add the surface of the four great lakes of Southen Sweden.**

| Total                | 3,109,772               | 187                |

**Historical and Political Divisions and Towns.**—Sweden is divided into three great sections, of which the one southern is called Götaplan or Göta Rika, the central section more properly by Sweden or Svealand, and the northern Norrland. Each of these great sections was in course of time subdivided into several provinces, according as it appeared requisite for the purposes of administration. But this system of provincial subdivisions, as another was adopted, by which some of the provinces were divided into two or three districts; whilst, on the other hand, in a few cases two provinces of the older division were united into one administrative district: these modifications are clearly shown. We shall give both the older and the more modern divisions.

The towns of Sweden are very small: many of them in England would hardly be called villages. They amount in
Halland comprehends the maritime region of that name, and the western declivity of the table-land of Småland. It forms one län.

Halmstad län has good forests and fisheries, especially in the rivers; the salmon is considered the best in Sweden, and forms a considerable article of export to other provinces. The capital, Halmstad, has 1853 inhabitants, and exports timber, pitch, tar, and the produce of the mines of Jönköping län. Woolen stuffs are manufactured.

Western Götaland comprehends the north-western portion of the table-land of Småland, and its declivity in that direction to the banks of the Göta Elf, and also the plains the north of Lake Vänern. The towns of Mariestad, Jönköping, and Vänersborg län, the largest part of Vänersborg län, and a small part of Göteborg län are in this province.

Mariestad län comprehends the greater part of the plain south of Lake Vänern, and is fertile, well cultivated, and populous. It has some iron-mines and alum-works at Mount Kinne Kulle. There are also some considerable glass-houses. The capital, Mariestad, is on the shores of Lake Vänern, and has 1573 inhabitants. Skara, in a very fertile district, has 3150 inhabitants.

Vänersborg län extends over the western and smaller part of the plain south of Lake Vänern, the north-western part of the table-land of Småland, and the eastern part of the valley of the Göta Elf. It contains the province of Västergötland, and is fertile, but less indifferent soil. It has some iron-unies, but the produce is not great. The capital, Vänersborg, is built near the efflux of the Göta Elf from Lake Vänern, and carries on a considerable commerce in iron. The population is 3500.

Bohuslän extends over the western and more sterile portion of the rocky region. The inhabitants of the coast obtain their livelihood by fishing and gathering lichens, which are used as a dye-stuff. In the eastern parts are cultivated vineyards and hops, with some other vegetables.

Göteborgs län comprehends Bohuslän and a small portion of Western Götaland, which surrounds the capital. The latter-mentioned district is rather fertile. The capital is Göteborg, with 19,500 inhabitants. Marstrand is built on a rocky islet, about four miles from the continent: it has a good harbour, and is inhabited by fishermen. The population is 1113. Uddevalla, built at the innermost recess of a deep inlet, has a good harbour and exports timber. It has a manufacture of cables and a sugar-house. The population is 3917. Stenstorp, near the boundary-line of Norway, has a harbour, and 1590 inhabitants, who are mostly occupied in fishing lobsters and oysters, which abound along this coast. The capital, Göteborg, is considered the greatest of all the towns of Götaland, and forms the northern part of Vänersborg län. It comprehends the eastern and more fertile districts of the rocky region. The low tract along Lake Vänern is one of the most fertile districts in Sweden. In this province the small town of Amal, with 1457 inhabitants.

Vermland comprehends that part of the region of mines whose drainage runs into Lake Vänern, and extends northward to 61° N. lat. There are fertile tracts along the banks of the lake: the interior has an inferior soil, but is richer in iron-mines than any other province of Sweden. Their annual produce amounts to 12,500 tons, or nearly one-fifth of the produce of the kingdom. The iron is collected in the district of Carlstads län, and the capital of Wenerborg, by way of Wenerborg. From Göteborg this iron is exported to all parts of the world. Vermelands forms Carlstads län.

Carlstads län has for its capital a town of the same name, built on the small island of Tingvald, near the influx of the Elvedal into Lake Vänern: it is the centre of a considerable commerce with all the mining districts of Vermland: the population is 3034. Christianshamn is situated at the most northeastern angle of Lake Vänern, and exports iron and timber to Wenerburg, and Göteborg. Its population is 1759.

Eastern Götaland lies between Lake Wettern on the west and the Baltic on the east, and contains the whole coast, as well as the plain of Småland south and north of it. The plain is rich in agricultural produce; the higher grounds have considerable iron-mines, which
produce annually 1300 tons of bar-iron: there are copper mines at Otvilsberg. The eastern part of the Göta canal traverses Götaljorden from west to east. It forms one län.
m. Linköpings Län: the capital of this län is situated in the centre of the province, about two miles south of Lake Roxen; the town of Linköping, which in 1897 had 3710 inhab., is a pretty, well-built place, with a fine cathedral and a good grammar-school. It has some manufactures of wool, stockings, and tobacco: the population is 3710. Söderköping is situated on the Göta canal, about two miles from the town; it joins the third branch or Slite branch of the Baltic Canal. It is a small place, with about 1000 inhabitants. The largest place is Norrköping, with 12,880 inhab. Wadsö is built on the banks of Lake Wetter, and contains 2168 inhabitants: much lace is manufactured there of the finest quality. It has some carpets and millinery. Sigtuna, a small town, is situated at the northwestern part of the Län, there are extensive iron works.
13. Upland, west of Upland and east of Norike, contains a small part of the central agricultural region, with a large part of the northern part of the Län. The iron-mines yield an annual produce of more than 7000 tons. At Sala there are the richest silver-mines in Sweden. There are also copper and lead mines, but their produce is not great. This part is called Sala-Western Län.

Western Län has obtained that name from its capital, Westerns, which is built on an arm of Lake Mälaren, and carries on a considerable commerce in iron. It has 3344 inhabitants, and manufactures of tobacco and some dye-houses. Sala, north of Westerns, has 2916 inhabitants: in its vicinity are the silver-mines. Arboga, on the river Arboga, which begins to be navigable for river boats at that place, has some commerce in iron and grain, and 1747 inhabitants. Strömsholm, a royal palace, is built on the islands of Laksholmren, southern part of Westerns Län, where the Strömsholms Canal joins the lake.

15. Dalarna, or Dalecarlia, lies entirely within the region of the mines, with the exception of the northern part, which belongs to Sweden. [Dalecarlia, vol. vii., p. 280.] It constitutes Falu Län.

f. Falu Län contains Falun (Falun), with 4050 inhabitants; and Hedemora, a small town situated in a fertile district, with 1033 inhabitants.

16. Gestríkland is situated within the region of the mines, of which it constitutes the most north-eastern portion. This is the most northern part of Sweden in which wheat is grown to any extent. It has good forests and mines, and forms the southern part of Gestríkland Län.

17. Helsinge, north of Gestríkland, within the limits of the southern mountain-region, produces rye and barley, and has good forests and mines. It forms the northern part of Gestríkland Län.

u. Gestríkland Län is composed of Gestríkland and Helsinge, and has rich iron-mines which yield an annual produce of more than 9000 tons. Flax is cultivated on a large scale, and exported to a considerable amount, though more linen is manufactured here than in any other part of Sweden. The forests supply other articles of export. Gestríkland Län is situated on the banks of the Gulf of Bothnia, which forms a good harbour. It is one of the best-built towns of Sweden, has 9200 inhabitants, and several good institutions for instruction, among which is a school for navigation. The commerce is considerable, and the exports consist of iron-works, iron-mines, and wood from the town. The exports consist of iron, timber, tar, flax, and linens; and the imports principally of corn and salt. It has some sugar-houses, and manufactures of sail-cloths, linens, and tobacco. Many vessels are built; and some families obtain their living by fishing. Süderhamn, at the extremity of a narrow inlet of the Gulf of Bothnia, has 1629 inhabitants, and exports butter, flax, and linens. Sail-cloth and linens are manufactured. Hudiksvall, on a tolerably good hill, is the most northern town in the province, with 1136 inhabitants, and exports timber, flax, linens, and butter.

18. Medelpad, and
19. Angermanland, form
a. Hernösland Län, of which a description is given under Angermanland (vol. ii., p. 16).

20. Herjedalen consists only of the elevated and narrow valley of the upper course of the Ljungan Elf, and extends to the declivity of Mount Sydöfoten. It has some iron mines, and is the seat of Oresunds Län.

21. Jemtland contains the table-land which derives its name from it, the upper valley of the Ljungan Elf, which lies south of it, and a large mountain-tract which lies north of it. It has some iron mines, and contains the upper valleys of the rivers Indals and Angerman. No commerce and manufactures, but there is a copper-mine at the base of Areskuta. Agriculture is followed only on the lower part of the table-land, near the large lake called Södra. It is a part of Oresunds Län.
Internal Commerce.—The internal commerce must be considerable in a country a great part of which, such as the mining districts, does not produce sufficient corn for the consumption, and must be supplied with bread from other parts of the country. Several other articles, as salt, must also be brought from foreign places. The manufactured goods, especially the linen of Wester- 
borg Län, which are carried to the most remote parts of the country, add also greatly to the internal commerce. This commerce is facilitated by the excellent roads, and in places by the use of the canals. The produce of Sweden is sent by water, chiefly by barges varying between four and five months, which renders the conveyance of goods in sledges easy and expeditious. In summer, a like advantage is derived from the navigation of the sea, which washes most of the provinces. In the provinces which lie farther inland, there are also canals for carrying goods, which render the transport of goods easier and less expensive. It is said that the number of vessels employed in the coasting trade to carry the goods from one port to another amounted, in 1831, to 1,269, and that the aggregate burden was about 67,000 tons. The number of large river barges and boats which are used on the canals is much greater. The statements respecting the navigation of the canals give us some idea of the internal commerce of the country. In 1831 the Holmian Canal was navigated by barges of 12 or 13 tons burden and upwards, and by 363 barges of less than 40 tons burden, besides 377 large boats and 32 rafts. They brought to Göteborg large quantities of iron and steel, and timber and hemp; they carry also corn, linseed, herring, 
whiskey, salt, herrings, sugar, butter, fish, wine, and some other articles. The navigation began on the 21st of April and closed on the 31st of December. Through the Arogsa Canal there passed, in the same year, 129 barges of 15 tons burden or upwards, and 36,126,270 tons. They brought to Stockholm bar-iron, alum, and corn, and took to the interior salt, herrings and stonings, whiskey, and some other articles. The navigation began on the 4th of May and closed on the 15th of November. The Södersjek Canal was navigated by 434 barges of more than 12 tons burden, and by 70 smaller vessels. The goods which they carried were of very different descriptions; the most important were iron, salt, herrings, bricks and tiles, and whiskey. The navigation began on the first of May and closed on the 27th of December.

Navigation.—The Swedes are much given to a seafaring life. Their vessels visit most of the countries of Europe, and they are particularly active in the carrying trade between other countries, especially in the Mediterranean, and on the coasts of South America. The number of sea-going vessels amounted in 1832 to 1,061, with a tonnage of 136,268. Of this number 406 smaller vessels, with a tonnage of 26,675, were employed in the coasting trade, in the navigation on the lakes of Wener and Wettern, and in the fisheries. The remain- 
er, 675 vessels, with a tonnage of 119,339, carried on the Baltic, and with other vessels on the Baltic, the amount of shipping is owned by the following twelve towns: Stockholm has 146 vessels, with 30,500 tons burden; Gefle, 76 vessels, with 17,712 tons burden; Göteborg, 72 vessels, with 16,900 tons burden; Visby, 77 vessels, with 6,912 tons burden; West- 
tervik, 35 vessels, with 41,422 tons burden; Carlshamn, 35 vessels, with 41,353 tons burden; Sundsvall, 21 vessels, with 3910 tons burden; Carolins, 48 vessels, with 3442 tons burden; Malm, 87 vessels, with 2690 tons burden; Hals- 
ßon, 25 vessels, with 2690 tons burden; and Udefalla, 12 vessels, with 2627 tons burden.

Foreign Commerce.—The commerce of Sweden may be called large when it is considered that the country is so dispersed over an immense tract of country. The value of the exports varies between ten and fourteen millions of dollars, or between 772,798£, and 1,081,965£; and that of the imports between ten and fifteen millions of dollars, or

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between 772,789l. and 1,159,190l. The imports sometimes considerably exceed the exports in value, but this is only the case when the crops have failed, and considerable quantities of corn are imported, which was the case in 1826 and 1828.

The most active commerce subsists between Sweden and the countries surrounding the Baltic, the Netherlands, Great Britain, France, and Portugal. The commerce with Spain and the states of Italy is less important. The commerce with Brazil is very considerible. The statements respecting the commercial intercourse of Sweden in 1831 are contained in the following tables:

**Table I. exhibiting the Value of the Goods imported into Sweden.**

<table>
<thead>
<tr>
<th>Names of Countries from which exported.</th>
<th>In Swedish vessels.</th>
<th>In foreign vessels.</th>
<th>Total.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>£50,850</td>
<td>£69,515</td>
<td>£119,395</td>
</tr>
<tr>
<td>Russia</td>
<td>86,171</td>
<td>82,653</td>
<td>168,824</td>
</tr>
<tr>
<td>Prussia</td>
<td>5,596</td>
<td>6,792</td>
<td>12,388</td>
</tr>
<tr>
<td>German States, exclusive of Hamburg and Lubeck</td>
<td>8,017</td>
<td>495</td>
<td>8,512</td>
</tr>
<tr>
<td>Denmark</td>
<td>70,834</td>
<td>18,455</td>
<td>89,289</td>
</tr>
<tr>
<td>Hamburg and Lubeck</td>
<td>155,950</td>
<td>600</td>
<td>156,550</td>
</tr>
<tr>
<td>Netherlands</td>
<td>14,417</td>
<td>1,233</td>
<td>15,650</td>
</tr>
<tr>
<td>Great Britain</td>
<td>44,581</td>
<td>90,292</td>
<td>134,873</td>
</tr>
<tr>
<td>France</td>
<td>25,593</td>
<td>4,438</td>
<td>29,931</td>
</tr>
<tr>
<td>Spain</td>
<td>11,245</td>
<td>4</td>
<td>11,249</td>
</tr>
<tr>
<td>Portugal</td>
<td>23,148</td>
<td>75</td>
<td>23,223</td>
</tr>
<tr>
<td>Naples and Sicily</td>
<td>2,469</td>
<td></td>
<td>2,469</td>
</tr>
<tr>
<td>United States of N. America</td>
<td>12,404</td>
<td>57,577</td>
<td>69,981</td>
</tr>
<tr>
<td>Brazil</td>
<td>104,283</td>
<td>3,359</td>
<td>107,642</td>
</tr>
<tr>
<td></td>
<td>616,258</td>
<td>334,444</td>
<td>950,702</td>
</tr>
</tbody>
</table>

**Table II. exhibiting the Value of the Goods exported from Sweden.**

<table>
<thead>
<tr>
<th>Names of Countries to which exported.</th>
<th>In Swedish vessels.</th>
<th>In foreign vessels.</th>
<th>Total.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>12,958</td>
<td>27,716</td>
<td>40,674</td>
</tr>
<tr>
<td>Russia</td>
<td>10,882</td>
<td>83,797</td>
<td>94,679</td>
</tr>
<tr>
<td>Prussia</td>
<td>34,350</td>
<td>8,817</td>
<td>43,260</td>
</tr>
<tr>
<td>German States, exclusive of Hamburg and Lubeck</td>
<td>28,811</td>
<td>5,183</td>
<td>33,994</td>
</tr>
<tr>
<td>Denmark</td>
<td>110,001</td>
<td>10,369</td>
<td>120,369</td>
</tr>
<tr>
<td>Hamburg and Lubeck</td>
<td>67,237</td>
<td>384</td>
<td>67,621</td>
</tr>
<tr>
<td>Netherlands</td>
<td>17,995</td>
<td>8,233</td>
<td>26,228</td>
</tr>
<tr>
<td>Great Britain</td>
<td>113,800</td>
<td>143,979</td>
<td>257,789</td>
</tr>
<tr>
<td>France</td>
<td>46,910</td>
<td>5,633</td>
<td>52,543</td>
</tr>
<tr>
<td>Spain</td>
<td>3,202</td>
<td>91</td>
<td>3,293</td>
</tr>
<tr>
<td>Portugal</td>
<td>44,047</td>
<td>12</td>
<td>44,059</td>
</tr>
<tr>
<td>Gibraltar</td>
<td>1,081</td>
<td></td>
<td>1,081</td>
</tr>
<tr>
<td>Sardinian States</td>
<td>4,263</td>
<td></td>
<td>4,263</td>
</tr>
<tr>
<td>Turkey</td>
<td>10,249</td>
<td></td>
<td>10,249</td>
</tr>
<tr>
<td>Naples and Sicily</td>
<td>222</td>
<td></td>
<td>222</td>
</tr>
<tr>
<td>Austria</td>
<td>1,445</td>
<td></td>
<td>1,445</td>
</tr>
<tr>
<td>Algiers</td>
<td>402</td>
<td></td>
<td>402</td>
</tr>
<tr>
<td>Egypt</td>
<td>3,197</td>
<td></td>
<td>3,197</td>
</tr>
<tr>
<td>United States of N. America</td>
<td>82,164</td>
<td>247,237</td>
<td>329,401</td>
</tr>
<tr>
<td>Brazil</td>
<td>26,253</td>
<td></td>
<td>26,253</td>
</tr>
<tr>
<td></td>
<td>591,560</td>
<td>517,313</td>
<td>1,108,873</td>
</tr>
</tbody>
</table>

The principal articles of export from Sweden are iron and timber. Great Britain, France, and Portugal take large quantities of both articles; the United States of America and Prussia take only iron; the countries of Italy, timber; Norway takes a considerable quantity of iron, and sends fish in return. The intercourse between Sweden and Russia is of a peculiar nature. The two countries have nearly the same productions, and there would of course be very little commercial intercourse between them if Stockholm did not receive from Finland three-fourths of the firewood which it consumes. Some years ago the Swedish legislature gave a considerable premium for firewood brought to Stockholm from the northern provinces, but it was found that the expense of conveying it to the capital was too great and that the firewood thus imported could not enter into competition with that from Finland. Finland also exports a considerable part of its produce to Stockholm, as meat, butter, cheese, bacon, flour, hides, pitch, and tar. The intercourse with the other provinces of Russia is inconsiderable.

The other articles of export, besides iron and timber, consist of copper, cobalt, and alum, of tar, pitch, hemp, oil, paper, wood, tobacco and snuff, bricks, tiles, furs, some linens, vessels, and some minor articles. The chief articles of import are sugar, coffee, salt, fish, hides, cotton-twist, cotton in wool, woollen stuffs, linens, cottons, wines and brandy, wool, dye-stuffs, raisins, almonds, pepper, cinnamon, arnack and rum, butter, bacon, tobacco, soap, train-oil, oil, ginger, lacquered ware, tea, tobacco, potash, and oil.

**Table III. exhibiting the amount of Shipping employed in the commercial intercourse of Sweden with different Countries in 1831.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>11,658</td>
<td>37,286</td>
<td>48,944</td>
</tr>
<tr>
<td>Russia</td>
<td>46,114</td>
<td>119,395</td>
<td>165,509</td>
</tr>
<tr>
<td>German States, exclusive of Hamburg and Lubeck</td>
<td>9,955</td>
<td>1,437</td>
<td>11,392</td>
</tr>
<tr>
<td>Denmark</td>
<td>15,447</td>
<td>9,081</td>
<td>24,528</td>
</tr>
<tr>
<td>Hamburg and Lubeck</td>
<td>6,015</td>
<td>9,696</td>
<td>15,711</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11,519</td>
<td>42,724</td>
<td>54,243</td>
</tr>
<tr>
<td>Great Britain</td>
<td>12,060</td>
<td>28,439</td>
<td>40,499</td>
</tr>
<tr>
<td>France</td>
<td>7,726</td>
<td>18,267</td>
<td>25,993</td>
</tr>
<tr>
<td>Spain</td>
<td>17,757</td>
<td>19,213</td>
<td>37,660</td>
</tr>
<tr>
<td>Portugal</td>
<td>18,512</td>
<td>381</td>
<td>18,893</td>
</tr>
<tr>
<td>Stockholm</td>
<td>4,503</td>
<td></td>
<td>4,503</td>
</tr>
<tr>
<td>Naples and Sicily</td>
<td>6,382</td>
<td>38</td>
<td>6,420</td>
</tr>
<tr>
<td>Austria</td>
<td>1,081</td>
<td></td>
<td>1,081</td>
</tr>
<tr>
<td>Algiers</td>
<td>303</td>
<td></td>
<td>303</td>
</tr>
<tr>
<td>Egypt</td>
<td>4,066</td>
<td></td>
<td>4,066</td>
</tr>
<tr>
<td>United States of N. America</td>
<td>1,828</td>
<td>6,185</td>
<td>8,013</td>
</tr>
<tr>
<td>Brazil</td>
<td>5,477</td>
<td>500</td>
<td>5,977</td>
</tr>
<tr>
<td></td>
<td>161,920</td>
<td>164,745</td>
<td>326,665</td>
</tr>
</tbody>
</table>

**Education.** Sweden has two universities, Upsala and Lund. The number of students who were matriculated in 1830 amounted to 2085, of which number however only 1263 were attending the lectures. The number of grammar-schools, of which some are called gymnasia, and others tree schools, is considerable, and consists only of 2017, with 6431 boys. Besides these there are in most of the larger towns middling schools. The number of boys who attended these schools amounted in 1830 to 3083. There are regular elementary schools only in the towns, and not in all of them: in 1830 there were only sixty-six schools of that description, in which 262 teachers were employed in teaching 4340 boys. In some parts of the country there are parish schools, and some larger villages have their own schools; but the country children are generally instructed by ambulancy teachers. For that purpose every parish is divided into school districts, each of which is visited at a certain season of the year by one or more teachers, who remain there from six to twelve weeks. This arrangement is made necessary by the population being so much scattered that the children would be obliged to walk a great distance if schools were established at fixed places. This system of instruction might be supposed to be defective; but it is stated by authority, on which every reliance can be placed, that the proportion of persons who cannot read, is so small, that can as is 1 to 1000. It is however a general practice in Sweden for parents, especially those who live in the country, to instruct their children in the long winter evenings.

(Von Buch's Travels through Norway, Lapland, and Sweden; Thomson Travels in Sweden; Everest, Travels through Norway, Lapland, and part of Sweden; Schubert's Reise durch Schweden, Norwegen, Lapland, &c.; Forsslund's Sta...
The early history of Sweden, as of the other Scandinavian nations, is known chiefly from the Sagas, or chronicles, which present little more than a confused mass of fables and heroic legends. The first ascertained dynasty of kings is that of the Ynglings (so called from the third of their number, Præster Olaf, a grandson of Olaf), who reigned from the arrival of Olaf in the north, an event variously fixed at from A.D. 50 to A.D. 220, till about A.D. 630, when the last of these princes, Olaf Trätela, was expelled by the Danish Yngling. The Ynglings, a branch of the Scyldungs, another branch of the progeny of Olaf.

The throne of Sweden and Denmark continued for some time united under the descendants of Yngl Vifadame, till at the death (794) of the famous pirate-king Ragnar Lodbrok, with whom Olaf was familiar, his son, Biknu, again became a separate kingdom under his second son Birn Ironside.

Under Birn II., grandson of Birn Ironside, Christianity was first introduced in Sweden: but the mass of the people still adhered to pagonism; and Erik, who reigned 982-1010, perished in a popular revolt provoked by his demolition of the heathen temples. His son Olaf however (1001-26), surnamed Skot-Konung, or the Tribute-King, from a tax which he paid to the pope, formally established Christianity. The death of the relation was completed by his son, Emund-Jacob (1026-51), for whom the severity of his legislative enactments procured the surname of Kolbrenner (the Coalburner). His successor, Emund Sicune (1051-68), fell in battle against the Goths of Gotland, then in revolution from the authority of the Ynglings and the male descendants of Birn Ironside being extinct, a fresh dynasty was founded (1056) by Stenkil, under whom the Swedes and Goths were for the first time united. The princes of his line, four of whom reigned from 1056 to 1129, were chiefly remarkable for their pacific virtues, and their zeal for extirpating the relics of pagonism. On the death of the last, Inge II., the Swedes conferred the royal dignity on a private individual named Sverker (1129-50); while to obviate complaints at the birth of a new dynasty, the claims of Erik (afterwards canonized), a descendant by females of the house of Stenkil, it was agreed that Erik should succeed Sverker, and that the representatives of the two families should in future reign alternately. The reign of St. Erik (1156-61) was signalized by the final conquest and conversion of the Fins (1154), and by the compilation of an excellent code of laws: but after his death, the strange arrangements above mentioned gave rise, as might have been foreseen, to endless discensions and civil wars. The alternation of the royal house continued under the reign of Charles (1161-7), son of Sverker I.; Knut or Cateau, son of St. Erik (1167-99); Sverker II., son of Charles (1199-1210); Erik, son of Knut (1210-16); John Sverker, son of Knut, who succeeded, in succession, to Carl Lassep, or the Stammerer, with whom expired the male line of St. Erik, as that of Sverker had done with John.

Waldemar (1205-76), of the Folkung family, and a nephew of Erik Lamspe by the sister's side, was raised to the vacant throne by election of the states, the government being confined during his minority (till 1266) to his father, Birger Jarl, who founded Stockholm (1254), removing the capital thither from Upsala, and first legalized hereditary nobility and inheritance by females. Waldemar was de- throned by his brother Magnus Ladulæus (1256-90), a wise and politic monarch; but the reign of his son Birger (1290-1319) was again a scene of fraternal discord, ending in his deposition in favour of his infant nephew Magnus Smek (1319-63), who also succeeded in right of his mother to the crown of Norway. The long reign of this weak and per- fidious prince was a series of domestic treasons, and dis- trouss civil and foreign wars: he was deposed by the Diet in 1343, and his son Erik XII. substituted; and though re- stored in 1350, he was deposed by the same Diet in 1353, and dispossessed of his power by his brother, Albert of Mecklenburg (1353- 61). But the rule of Albert was as unpopular as that of his predecessor; and he was overthrown and made prisoner (1361) by a revolution supported by the Semirams of the North, Queen Ingrid of Norway and Denmark.

This remarkable princess was daughter of Waldemar At- terdæ, the last male of the ancient Danish kings, and widow of Hakon, king of Norway, a son of Magnus Smek. On the death of her son Olaf (1387), she had been declared queen-regnant of these two kingdoms: and having by the fall of Albert become mistress of Sweden, she formed the three northern realms into a confederate monarchy by the vociferous Union (1389), the three sovereigns being declared indisputably united, though the internal administration of each kingdom continued independent and separate. Margaret was succeeded by her grand-nephew Erik of Pomerania (1413-39), but his tyranny irritated the Swedes, and he was deposed (1435), and the throne declared for Sten Sture (1435-50), the first of the Swedish dynasties. The rule of this first chief of his successors, Svante Nilsson Sture (1505-12), and Sten Sture II. (1512-20), is marked by the incessant efforts of the Danish kings to render their nominal supremacy over Sweden effectual, either by policy or arms; till Christian II., assisted by the powerful family of Trolle, which was at feud with that of Sture, defeated and slew Sten Sture II. at Bogesund, and massacred at Stockholm (October 8, 1520) ninety-four prelates, senators, and privy councillors. The illegitimate son of Erik, II., surnamed Eriksson Vasa, the son of one of the victims; and the expulsion of the Danes (Christian being opportunely dethroned at the same time in Denmark) was followed by the unanimous proclamation of Gustavus, as king of the Swedes and Goths. Thus ended the Union of Cal- mar.

With the establishment of the dynasty of Vasa, the his- tory of Sweden, as an independent and respectable king- dom, may properly be said to commence; and the new era was at once distinguished by a change of religious and political doctrines that had been introduced in 1522 by Olaus Petri, a disciple of the great reformatior, and so rapid was their progress, that in 1525 the Confession of Augsburg was solemnly rejected, and the word of God was publicly taught by many who had hitherto been excluded from the diet of Westphalia, as at the preceding assembly, and the notably the union of the nation.

The conclusion of commercial treaties with England and the Netherlands (1550) gave a new impulse to trade and navigation; and foreign artisans were invited to settle in Sweden, and there construct the towns and roads, that had been neglected in the country, which under this wise policy attained a degree of affluence and prosperity hitherto unknown, and was raised from the condition of a semi-barbarous and de- }
hibited the obnoxious fact, and raised the duke of Soder-
man to the throne as Charles IX. (1604-11) in the place of
his nephew. From this revolution arose the Swedish-
Polsar war of succession, which continued almost without
intermission for 60 years (1600-66). At first the Poles were
succeeded by his uncle, Charles IX, a cautious and de-
fianting enemy. But when the Swedes at Kerkholm (1597)
but the attention of both was
drawn off by the distracted state of Russia, which had be-
come a prey to anarchy and civil war since the extinction
of the line of Rurik in 1598. Sweden at first espoused the
cause of the Ruriki, and went in aid of the famous General de la Garde: but on the fall of their
ally the Swedes occupied Kexholm and Novgorod, and even
attempted to raise Charles Philip, second son of the Swedish
king, as a pretender to the throne of Russia. A short but bloody war
of Denmark (1611-13), usually called the war of Calmar, on
the subject of the northern limits of Lapland and Norway,
was ended to the disadvantage of Sweden by the peace of
Siord: but in the meantime Charles IX. had been succeeded
by his son, the famous Gustavus Adolphus (1611-32).
The first acts of his reign were directed to legislative improve-
ments and the extension of commerce and agriculture, in
which he was aided by his illustrious minister Oxenstierni; but
the privileges of the nobles, whom his father had cur-
tailed, were restored and even extended. By the peace of
Stolbova (1617), concluded under the mediation of England,
Russia ceded all her remaining territory on the Baltic; and
the king, heading his army against the Poles, took Riga (1621),
but the processional was renewed in Livonia, where
the Swedes were ceded to Sweden (1629) by the truce of Altmark. His
arms were now turned towards Germany, where the success
of Austria in the Thirty Years' War seemed to threaten
Protestantism with annihilation; and being chosen captain-
general of the Protestant forces in Germany, Gustavus
admitted the title of king of Sweden, to which he was
crowned on the 18th June, 1630: but the campaigns and victories of the Lion
of the North, till his fall in the moment of triumph at
Liitzen (November 6, 1632), belong to German rather than
Swedish history.

Christina (1622-54), the daughter of Gustavus Adolphus, succeeded
at the age of six years, under the guardianship of
Oxenstierni, who administered the kingdom with consummate
abilitv; while the generals Wrangel, Torstensson, Bannier, and
Bernhard of Saxe Weimar, carried the renown of the
Swedish arms to the highest pitch in Germany. A short
war with Denmark (1643-45), in which Sweden was the
aggressor, was terminated to the advantage of the latter by
the peace of Bromsebro; and at the general peace of
Westphalia (1648), Sweden received Pommerania, Rugen, Bremen,
&c., with the annexed rights as a state of the empire:
acquisitions which elevated her to the rank of a first-rate
power. But the eccentric tastes of Christina, who was
dowered with a genius for art, but who despised the
interests of government; and in 1654 she abdicated the crown in
favour of her cousin, the Count Palatine de Deux-Ponts,
who retired to France, and afterwards to Rome, where she
died a Roman Catholic in 1659. The new king, Charles
Gustavus, of whom we have spoken, added to the
position of Poland, which he completely overran, taking Warsaw, Cracow, &c.:
then attacking Denmark, which had espoused the cause
of Poland, he crossed the Ocest on the ice, menaced Copen-
then, and compelled thecession (by the peace of Roskilde,
1658) of Scania and all the other Danish provinces beyond
the Sound. A fresh attempt to subdue Denmark com-
pletely was frustrated by the succour of the Prussians and
Dutch, who repulsed the Swedes from before Copenhagen;
and at the battle of Ekeren, the expedition of the
Dutch hastened his death. During the minority of his son Charles
XL (1660-97), the long contest with Poland was concluded
(1660) by the peace of Oliva; Livonia, Estonia, and Oesel
were confirmed to Sweden, and the claim of the Polish
kings to the Swedish crown was given up. The rise of
the French and anti-French parties at court produced several
changes of policy; but the predominance of the former at
length gave rise to a war with Prussia and Denmark
(1672-79). After the battle of Fontainebleau (1679) regained all that they
had lost. This reign was also the epoch of the first struggle
between the crown, supported by the burghers and peasants, and
the nobles, who, under the title of the estates, and united
with the crown lands (1680), and the liquidation of the public
debt by raising the value of the currency (1686), were
the preliminary measures; and in 1693 the king was formally
declared absolute by an act of the Diet. He died in 1697,
leaving his dominions to his son, the famous Charles XII.
(1697-1718), then only fifteen, in the highest state of
prosperity and organization; but the inexperience of the young
king tempted the attacks of his neighbours, and a coalition
was formed against him (1699) by Poland, Denmark, and
the United Provinces, which, after a long and
odiuous war, were joined by France in 1701, and, in two
years, expelled the king, Frederic Augustus, elector
of Saxony, and divided the kingdom of Stanislaus
Leszinski (1704) in his room; while Frederic Augustus,
by the treaty of Alt-Ranstadt (1706). Europe viewed with amazement the career of the Swedish
hero: but his invasion of Russia (1708-9) was fatal to his
schemes of ambition. Having turned aside into the
Ukraine to form a junction with the Cossack chief Ma-
zeppa, he was overthrown at Pultowa (July, 1709),
and took refuge for five years in Turkey; while the league
against him was joined by Denmark, Prussia, and
England, and all his conquests flourished; the Dutch and
the Russians, who had gained as generals, were lost as rapidly as they had been gained.
In 1715 he returned to Sweden; but while he was endeavou-
ing to re-establish his power both by arms and by the subtle
diplomacy of his minister Goetz, he fell at the siege of Fre-
derichshund (August 24, 1718), the wire of which
extended to the Baltic Sea. The peace of Stockholm
(1719) with England, Denmark, Prussia, and Poland,
she resigned the crown in favour of her husband Frederic
of Hesse-Cassel (1720-51), whose authority was still further
limited by the Act of Royal Assurance, exacted from him
by the states. The treaty of Stockholm, which was
considered in England as an act of war, and which, as
long gave peace to the exhausted kingdom; but Ingra,
Livonia, Estonia, Carelia, Oesel, &c., were ceded to the
Czar, and Sweden sunk thenceforth into a second-rate
power.

For the next twenty years the court of Stockholm was a
scene of foreign intrigue and corruption, in which the Hats,
or French party, and theCaps, or Russian faction, alter-
nately predominated, the royal prerogative being almost
annihilated by the power of the aristocracy; but agriculture
continued its prosaic progress, while the commerce and
the arts were languishing. The Russian and Russian
had been to England, and the Czar was
in difficulties. In 1731, the Czarina forced her brother
to resign the crown, and the Polish and German
parties combined under the name of the Zemski, or
vote, who negotiated a partition of
(1772), which was subsequently confirmed
by the treaties of Belts (1773), and Friedenblatt (1776). The
departure of the Austrian minister Karl
obstructed the peace of Armed Neutrality of the
together against England and
the Carina: while a commercial treaty was concluded (1763)
with the United States of America. But an alliance with
the Porte (1767) led to a war the next year with Russia, and
the

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with Denmark as her ally: but the mutinous conduct of the Swedish officers, who refused to invade Russia without orders from Karstrom (1792) had occasioned a plot, which was forced on the nobles by the other orders of the Diet, and which gave the king absolute power of war and peace, at the same time abolishing the senate, the last stronghold of aristocratic power. In the sea-fight of Viborg (July 3, 1790) the Swedes were defeated, and the Swedish fleet, under the command of Gustavus, was forced to retire. The triumphs of the Russian and Austrian fleets in the Baltic (July 10) at Svenskaund, taking or destroying 42 ships and 8000 men; and the peace of Werela (1790) was concluded on the basis of mutual restoration. The outbreak of the French revolution, the firmness of Russia, and the arrangements between Russia, and Austria, and a plan was concerted for a combined invasion of France under the command of Gustavus: but the king was assassinated the same year (March 16) by Ankarström, an agent of the discontented nobles; and his brother Gustavus (1792-1809), though induced by his nephew Gustavus IV (1792-1809), not only withdrew from the coalition, but recognised the French republic in 1795. The search of neutral vessels by the English, and some acts of hostility thence arising, provoked the formation of the Armed Convention of the North (1800) between Russia, Denmark, Sweden, and Prussia; but it was dissolved the next year at the death of the emperor Paul. In 1805, an alliance was formed with Russia and England against Napoleon. Sweden was compelled to renounce the title of king, the crown being given to his nephew Gustavus IV, 1807; and Russia, after the conferences of Tilsit, turned her arms against her late ally, and seized upon Finland. The surreptitious adoption of the French constitution, and the hanging of the archbishop, were followed by the separation of the government: an auxiliary force of 11,000 English, under Sir John Moore, was dismissed without effecting anything: the Danes also declared war; and Torna and the Aland Isles were taken by the Russians (1809). These mutual invasions were ascribed to the incapacity of the king, who was considered to have shown symptoms of mental derangement: and he was deposed (March, 1809) by a conspiracy of military officers, his uncle Charles XIII. (1809-18) being called to the throne to the exclusion of the sons of the last two members vying for the inheritance. A few aristocratic modifications were introduced in the constitution, as the appointment of a state-council of nine members, &c.; but the general outline was left as settled in 1772. The peace of Frederichkam with Russia (1809) was dearly purchased by the cession of Finland, East Bothnia, and Aland (or nearly one-fourth of the territory, with one-third of the population, of the kingdom): but France restored Pomerania (1810) on the adoption of the constitution from Stockholm, and 60,000 men were levied for the defense (1810) of the prince of Holstein-Augustenburg (who had been declared heir to the throne), the age and childishness of the king, necessitated a fresh election of a crown-prince: and the crown-prince of Portugal, in consequence of the death of the head of each of the 2300 noble families has a seat by right, but seldom more than 400 to 500 attend. The ecclesiastic order (of which the archbishop of Upsala is always president) consists, besides the twelve bishops, of about sixty deputies from the various dioceses. The presidents of the burgher and peasant houses are named by the king, and a small property qualification is required for a deputy: the proper number of burgher representatives is 97, of peasant representatives 306, and besides Stockholm, and 82 other cities and towns each 1 : the peasant deputies should be 144, returned by different districts; but the full number rarely if ever make their appearance. The expenses of the representation of the three orders are defrayed by the influenced by their constituents; and the civil and military employed of government, far from being ineligible, usually form a large majority of the whole body. The four orders sit and deliberate separately, and at other times altogether: and the question is carried or lost by a simple majority, unless it involves a fundamental change in the laws or constitution. In this case the motion cannot be debated in the same meeting in which it is propounded, but is adjourned to the next session, when it is discussed by a general congress of the four orders, and can only be passed by a unanimous vote. The Diet meets at Stockholm every fifth year, and the session should close at the end of three months, unless prevented by a press of business. RIBER. SWEDENBORG was a noted religious and child and eldest son of Jesper Swedberg, bishop of Skara in Westrogothia, and of Sarah Behm, daughter of Albert Behm, assessor of the board of mines, was born at Stockholm on the 29th of January, 1688. [SWEDENBORG.] Of his childhood and youth there is no record, excepting that his mind was early occupied by religious subjects. 'From my fourth to my tenth year,' says he, in a letter to Dr. Beyer, 'my thoughts were constantly engrossed by reflecting on God, salvation, and the hereafter. Of this time, which was about the age of fourteen, it was my greatest delight to converse with the clergy concerning faith, and I often observed to them that charity or love is the life of faith, and that this vivifying faith is no other than the love of one's neighbour.' Bishop Swedberg was succeeded in his charge on the education of his son, which he received principally at the University of Upsala. He was uncommonly assiduous in the study of the loss of Finland, the commerce of Sweden is now more than double what it was in 1800, and the opening of the Gothland Canal added to the commercial interests of the water-communication. It has been said that a party in the state will attempt, on the demise of the king, to supplant his son Oscar in the succession, and restore the son of Gustavus IV, now a general in the Austrian service: but it is improbable that any decided change for the better, whatever may be the stability of the present dynasty, the memory of Charles XIV will be deservedly held in reverence by his subjects in both kingdoms.
commonly supposed, either a count or a baron: he is always spoken of as a count, and, as 'the assessor Swedenborg,'

in his year he published three works in Swedish: 1. 'A

Proposal for a Decimal Arrangement of Coinage and Measures, to facilitate Calculation and suppress Fractions' (Stockholm); 2. 'A Treatise on the Motion and Rest of Bodies' (Upsal); 3. 'Proofs derived from appearances in Sweden, of the depth of the sea, and the greater Force of the Tides in the earliest ages' (Stockholm).

Occasional papers by him appeared in the 'Acta Litt. Suec,' for 1721-22, Two or three of which were afterwards combined (See Acta Germanica, pp. 66 to 66, and pp. 122 to 134, vol. i., London, 1742).

In the spring of 1721 he again went abroad through Denmark to Holland, and published the six following small books: 1. 'A Dissertation of Natural Philosophy, consisting of New Attempts to Explain the Phenomena of Chemistry and Physics by Geometry' (Pordromus Principiorum Rerum Naturalium, sive novorum tentaminum Chemiam et Physicam experimental in Geometria explicandi); 2. 'New Observations and Discoveries respecting Iron and Fire, with a new mode of constructing Stoves' (Nova Observatio et Inventa circa ferrum et ignem; una cum nova aequino inventione); 3. 'A new method of finding the Longitude, by the aid of the Heavens' (Methodus nova inveniendi Longitudines Lucorum, Terra Maritica, Ope Lunum); 4. 'A mode of constructing Docks' (Modus construendi Receptacula Navales); 5. 'A new way of making Dykes' (Nova Observatio et Inventa circa Aquas, Aquae Acquae); 6. 'Some Observations for Testing the Powers of Vessels' (Modus Mechanica explorandi Virtutes Navigiorum).

From Amsterdam he went to Aix-la-Chapelle, Leige, and Cologne, and visited the mines and smithery-worries near those places. He arrived at Leipzig in 1722, and there published, in three parts, 'Miscellaneous Observations on Natural Objects, particularly Minerals, Fire, and Mountain-strata' (Miscellanea Observata circa Res Naturales, prseritim mineralia, ignem et montum strata). At Hanover, during the same year, he published, 'On Minerals, Iron, and the Stalactites in Baumann's Cavern' (Precipice circa mineralia, ferrum, et stalactitas in Caverna Baumannianis). (Act. Eruditor. Lipsiæ, 1723, p. 96-7.) This work, like those which precede it, shows a rare power both of accumulating facts and applying principles. The last part gives the substance of several conversations between Charles XII. and Swedenborg, in which the king proposed a new 'sexagenarian calculus.' Swedenborg made the last an important addition to his knowledge of mining. At Blankenburg he experienced great kindness from Louis Rudolph, duke of Brunswick, who defrayed the whole expense of his journey, and at his departure presented him with a golden medallion, the weight of silver golden. After being abroad a year and three months, he returned home, and in the course of 1722 he published anonymously, at Stockholm, a work entitled 'On Swenska Myntets Formring och Förhöjning' ('On the Depreciation and Rise of the Swedish Currency') (Cib. Ecol. Upsal, 1814); and at the end of the same year he entered, for the first time, on the actual duties of the assessorship, the functions of which he had been unwilling to exercise before he had performed his knowledge of metallurgy. For the next ten years he divided his time between the instructions of the Royal Board of Mines and his studies. In 1724 he was invited by the consistory of the university of Upsala to accept the professorship of pure mathematics, vacant by the death of the celebrated Dr. Swedenborg, and he was for twenty months in visiting the Austrain and Hungarian courts.

Swedenborg's 'Opera Philosophica et Mineralia' were

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published in 1734, in 3 vols. folio, at Dresden and Leipzig; his patron, the Duke of Brunswick, at whose court he was a visitor, had received him with distinction. This work consists of three distinct treatises. The 1st volume is 'Principles of Natural Philosophy, consisting of new attempts to explain the phenomena of the elemental world in a philosophical manner' (Cramers Elements of the Art of Assaying Metals, 15, 2nd. edition, London, 1764.) In the same year, and at the same places, Swedenborg published 'An Introduction to the Philosophy of the Infinite, and the Final Cause of Creation. Or, Like the shape of a part, the impression is between the Soul and the Body' ('Prodomus Philosophiae Ratiocinantis de Infinito, et Causa Finali Creationis; de Mechanico Operationis Animae et Corporis'). This work connects his cosmology with his physiology.

Swedenborg had cultivated throughout Europe, and Christ. Wolff and other foreign literati eagerly sought his correspondence. On the 17th December, 1734, the Academy of Sciences of St. Petersburg appointed him a corresponding member.

In 1736 he again travelled, and in 1738 visited Italy, and spent a year at Venice and Rome. The journal of his tour, from 1736 to 1739, is in MS. in the Academy at Stockholm. At this time he no doubt applied himself particularly to anatomy and physiology. He published in his 'Economy of the Animal Kingdom' ('Economia Regni Animalis'), a large work in two parts, 4to., which he published at Amsterdam in 1740-41. The first part treats of the blood, the arteries, the veins, and the heart, concluding with an introduction to rational psychology. The second part treat of the coincidence between the motions of the brain and the lungs, of the cortical substance of the brain, and of the human soul. In 1741 he became a fellow, by invitation, of the Royal Swedish Academy of Sciences.

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A number of unpublished scientific MSS., written by him previously to this period, and which are preserved in the Royal Academy of Sciences at Stockholm, manifest his industry, and the largeness of his designs. The most important of these papers appear to be—'De Magnete,' p. 273, 4to.; 'De Sale Communis,' p. 334; 'Principia Rerum Naturalium, ex priori et posteriori educta,' p. 359; 'De Sensationibus,' cap. xvi., 'De Actibus, Partibus, et Causis, Medulla Oblongata, et Spinale, de Nervis, analytico, physice, philosophice; ' 'De Aure Humana'; 'Tractatus Partium Generations utrisque Sexus, et de Processu Generationis.'


We shall now endeavour to take a brief review of Swedenborg's scientific progress, with particular reference to method, principles, and doctrines. His proper career to be dated from the publication of those papers inserted in 'The Description of Arts et Metiers.' Each volume is subdivided into three parts, and illustrated by numerous copper engravings. (For an opinion on the practical merits of this work, see Mortimer's 'Tradition of Kramer's Elements of the Art of Assaying Metals, 15, 2nd. edition, London, 1764.') In the same year, and at the same places, Swedenborg published 'An Introduction to the Philosophy of the Infinite, and the Final Cause of Creation. Or, Like the shape of a part, the impression is between the Soul and the Body' ('Prodomus Philosophiae Ratiocinantis de Infinito, et Causa Finali Creationis; de Mechanico Operationis Animae et Corporis'). This work connects his cosmology with his physiology.

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Although he cultivated anatomy practically, he considered that the standard authorities of his time were more to be relied on than his own dissections ('Econom. R. An.', on which account he premised the descriptive statements of Heister, Winslow, Malpighi, Morgagni, Boerhave, Leewenboek, Swammerdam, &c., as his basis for induction. On the facts supplied by these authorities he built his own superstructure, which, if not strictly a physiological one, in the modern meaning of the word, stood an elevated and original system of animal geometry and mechanics. These great works were regarded by him as only the commencement of a work in which he designed to embrace the entire circle of physiology and actual particles. ('Etymologiae Regni Naturali,' Ratiocinantis, n. 14.)

At the beginning of 1745 Swedenborg published in two parts, 4to., 'The Worship and Love of God' ('De Cultu et Amore Dei'): the first part, on the origin of the earth, on paradise, and the birth, infancy, and love of the first man; the second part, on that which is next the soul, the intellectual mind, the state of integrity, and the image of God. This book is a sublimation of Swedenborg's scientific system, with a correlative statement of his psychical doctrines, in which both are blended, and clothed with the narrative of a process of sublimation, in his argument, the use of mythology, and a class of doctrines which was yet to come.
Swedenborg was in his fifty-eighth year when he published the last of the foregoing volumes, and from this period he assumed a new character, of which he gave the following account:—'I have been called to a holy office by the Lord, who most graciously manifested himself in person to me, and communicated to me a certain mechanical system, which I can direct into the spiritual world, endowing me with the gift of conversing with spirits and angels.' However repulsive such statements are to the generality of mankind, they are not without authority for their author. Swedenborg's mechanical system, embracing all science, nor does he once allude, in his works on theology, to his former scientific labours. He still however took part in the proceedings of the Diet, and in that of 1761 he is said to have presented the best memorial on the subject of finance.

He returned from London to Sweden in August, 1745, and immediately devoted himself to the study of Hebrew and the diligent perusal of the scriptures. He continued to read and meditate on the Holy Bible; and in the year 1747, when he asked and obtained his majesty's permission to retire from it; adding also two other requests, which were granted—that he might enjoy as a pension the salary of the office; and that he might be permitted to hold a higher rank which was offered him on his retirement. The materials for the subsequent part of Swedenborg's biography are exceedingly scanty. He was now either actively engaged in writing his theological works, or was travelling in foreign countries to publish them. When he was at home he lived in a house in the environs of Stockholm, with a large garden, in which he took great delight. He frequently resided in Amsterdam and in London. The highest personages in Sweden testified to the consistency with which he maintained the assertion of his spiritual intercourse. On one or two occasions, they say, he gave proof of his professions. Baron Grimm, after describing him as 'a man not only distinguished by his honesty, but by his knowledge and intelligence,' says that he 'made the most extraordinary visits on account of his official capacity.' He was a man of奄官--; that it is impossible to deny it; but the question is, how to believe it.' (Mem. Hist. Lit. and Anecdot., Sec., by Sir John de Grim, tom. iii., p. 56, ed. Lond., 1813.) The baron spoke of it precisely as he might of a man's fortune. A few years after, the booksellers of Sweden, at the instigation of the Protestant Bishop, Emanuel Kant sifted another of these stories to the bottom, and declared that 'Professor Schlegel had informed him that it could by no means be doubted,' and added, 'they set the assertion respecting Swedenborg's extraordinary gift beyond all possibility of doubt.' (Derschta des Lebens und Charakters Immanuel Kantis, Konigsberg, 1804.) Swedenborg however laid no stress on such proofs, 'because,' said he, 'they compel only an external belief, but do not convince the mind.' Swedenborg, the friend of the bishops, and the political favourer of the Presbyterians, of whom Dr. Ekebon instigated a prosecution against him in the consistory of Gotenburg, whence it was transferred to the diet. Dr. Ekebon denounced his doctrines as 'full of the most intolerable fundamental errors, seducing, heretical, and capacious,' and declared further, that he 'did not know Assessor Swedenborg's religious system, and would take no pains to come at the knowledge of it.' Swedenborg came out of these trials with safety, unaccompanied by no small expense; and with the approval of the bishops, and the collation of the consistory, he closed his career at Stockholm, 1771, while in London, he had a stroke of the palsy, from which he never perfectly recovered. A report has been circulated that he recanted his claims during his last illness, but this is a mistake. M. Perretius, minister of the Swedish church, and a great friend of Swedenborg, wrote in his will to Mr. Halle, to whom he bequeathed his books, and to whom he left a legacy, one hundred and twenty-five rixdollars, and a house in Stockholm, and administered the sacrament to me, wrote as follows (the 31st March, 1780) to Professor Trägård of Greifswalde:—'I asked him if he thought he was going to die, and he answered in the affirmative, which is what I requested him,
since many believed that he had invented a new theological system merely to acquire a great name (which he had already done by changing with the world), and not to claim the real truth to the world, and to recant either wholly or in part what he had advanced; especially as his pretensions could now be of no further use to him. Upon this account he raised himself up in bed, and, placing his hand upon his breast, gave the following statement, which I have written as true as that you now behold me: I might have said much more had it been permitted me. After death you will see all, and then we shall have much to declare of the Holy Scripture, and of Swedenborg the New Jerusalem, and of Heaven and Hell, and of all things. And since I have been on this earth, and on other planets, for the sake of my future existence. According to Swedenborg, heaven and hell are not in space, but they are internal and spiritual states, so that intimation into the spiritual world is only an opening of that which is already there; and God's face of the spiritual world resembles that of the natural world in every particular, and man's spiritual body appears precisely similar to his natural body; but the difference is, that all the objects of the spiritual world represent, and consist of, and are converted into, magnificient objects in the heavens being actually determined according to the good affections of the angels; and the terrible appearances in the hells being an outbirth of the evil and falsity of the infernals. Heaven and hell are from the heart, or soul, which is a kind of thougth or spirit, whether on this or other planets, for all the planets are inhabited, since the human race, and the formation of heaven therefrom, is the final end of creation. The Satan and Devil of the Apocalypse are not a name or title, but the person of him. The last judgment mentioned in the Gospel, was not the destruction of the world, which, like every divine work, has respect to infinity end eternity, and will endure for ever; but a judgment in the spiritual world, since all things are as different as day from night, and is called the spiritual spirit which is judged. This judgment commences for every individual immediately after death. Judgment is carried into effect on a church when its charity is extinct, and faith alone remains, and such judgment is attended by a plenary separation of the good and the evil, that is, by a formation of new heavens and new hells, and followed by the institution on earth of a new church. The judgment on the first Christian church took place in the year 1577; the second, in the year 1622, and a third will take place when he becomes entire in the spiritual world, after which commenced the descent from the new heaven of the new church and its doctrine, signified by the Apocalypse New Jerusalem. The particulars of the faith of this church on the part of man are: 1. That they are of their own, and that they are of the Lord, and that He is the Lord God and Saviour Jesus Christ. 2. That saving faith consists in believing on Him. 3. That evil actions ought not to be done, because they are of the devil, and from the devil. 4. That good actions ought to be done, because they are of God and from God. 5. And that they should be done by man, as of himself; nevertheless under the belief that they are from the Lord, operating in him and by him. The two first particulars are mentioned in the Apocalypse, and the last, to the conjunction of charity and faith, and thereby of the Lord and man. Concerning the Word of God, Swedenborg taught that in its origin it is the divine truth itself, infinite in the Lord; that in proceeding through the three heavens, it is accommodated to the capacity of the angels by successive unveilings; that in the highest heaven it puts on an appearance accommodated to angelic affections, and is there read in its celesstial sense; in the middle and lower heavens it forms sense according to the number of angels, and the rising of knowledge of the angels there, and is read in its spiritual sense; and in the church, it is presented in a natural and historical form, which is adapted to the understandings of men on earth. This last form thus contains, and corresponds to, a spiritual and celestial form. Swedenborg declares he was taught by the Lord in the spiritual world, and which he unfolded at length in his great work, the 'Aranae Coelestis.' The Books of the Word, says Swedenborg, are all those that have the internal sense; but those which have not the internal sense are not the Word. The Books of the Word in the Old Testament are the five Books of Moses; the Book of Joshua; the Book of Judges; the two Books of Samuel; the two Books of Kings; the Psalms; the Prophets Isaiah and Jeremiah; the Lamentations; the Prophets Ezekiel, Daniel, Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi. In the New Testament the Mattathew, Mark, Luke, John, and the Apocalypse. Although the writings of Paul and the other apostles are not in this list, and are described by Swedenborg, in a letter to Dr. Beyer, to be dogmatic or doctrinal writings merely, and not written in the style of the Word; yet in the same letter he says, 'Nevertheless the Writings of the Apostles are to be regarded as excellent books, and to be held in the highest esteem, for they insist on the two essential articles of charity and faith in, the same manner as the Lord himself has done in the Gospels and in the Apocalypse.' Swedenborg was a mediaval man, and laid down certain rules for the guidance of his life. These are found written in various parts of his MSS. as follows:— 1. Often to read the Word of God, and the Gospels, and other portions of the Scriptures, to the end of the law about the will to the end of Divine Providence. 2. To observe in everything a propriety of behaviour, and always to keep the commandments.
science clear. 4. To discharge with fidelity the functions of his employment and the duties of his office, and to render himself in all things useful to society.

Figure 4.2. Count Hopken, prime minister of Sweden, says of him, 'I have not only known Swedenborg these two-and-forty years, but some time since frequented his company daily; I do not recollect that he has ever done anything inoffensive to society.' As a public figure, he was universally and uniformly a virtuous character.

Sandel says, 'He was the sincere friend of mankind, and in his examination of the character of others, he was particularly desirous to discover in them this virtue, which he regarded as an infallible proof of their goodness.' As a private man, he was a preserver of that holy and bountiful disposition, which was never experienced the slightest indisposition. Content within himself, and with his situation, his life was in all respects one of the happiest that ever fell to the lot of man.

Swedenborg was never married. He was about five feet nine inches high, rather thin, and of a lean constitution; his eyes were brownish-grey, nearly hazel, and somewhat small. He never seemed to loa, but always had a cheerful smile on his countenance. 'Many would suppose,' says Ferelius, 'that assessor Swedenborg was a very eccentric person; but, on the contrary, he was so agreeable to society as to be versa on all the topics of the day, accommodated himself to his company, and never alluded to his principles unless he was questioned: in which case he answered freely, just as he wrote of them. But he observed to one person that he was designed to trifle with, he answered in such a manner that the querist was silenced without being satisfied.' (Ferelius in Tafel's Leben.)

(For further particulars the reader may consult Sandel's Sweden to the End of 1849, London, 1834; Documents concerning the Life and Character of E. Swedenborg, collected by Dr. I. F. I. Tafel, Tübingen, and edited in English by Rev. I. H. Smithson, London, 1841; Life of Swedenborg, sixth and last edition, New York, 1841, Boston, 1849, 1851; Tafel's Swedenborg's Leben, now in the press; The New Jerusalem Magazine, 1790-91; F. Walden's Assessor Swedenborg's Levant, Adalyyta Udog of summers skritter nogle blandede Tunker, tilligemed Swedenborg's System kurt adag, Kristiania, 1820; Lagerygg, Sera mandrag of Swe-Rhe Historia, 8vo, Stockholm, 1778-80.)

SWEDENBORGIANS, the people who believe in the mission of Emanuel Swedenborg to promulgate the doctrines of the New Church, signified by the terms 'Swedenborgian' and 'Swedenborgianism.' In this country they may be divided into two portions, one of which forms the denomination known as such to the world; while the other portion remains without visible separation from the community of the Church.

The formation of the Swedenborgians took place in 1788, in Great Eastcheap, London; since that time, societies have been formed in nearly all our large towns, until they now amount to between forty and fifty. These send delegates to an annual conference, which publishes the 'Intellectual Repository,' a periodical of thirty years standing, devoted to the cause.

In the United States of America the members of the New Jerusalem Church are numerous and well organised; they have three distinct annual conferences, of which that for the Eastern States meets at Boston; that for the Southern, at New York; and that for the Western, at Cincinnati; and they publish four different Swedishperiodicals. In France the doctrines of Swedenborg have excited much attention, partly through the writings of his eloquent disciple, Mgr. De Rémusat; and through the French translations of Swedenborg's works, which were executed by J. P. Moet, and published by John Augustus Tulk. In Germany, Swedenborg has long had isolated readers, of whom the most celebated is the Rev. Christian Zeller, Bishop of Hildesheim; and through the German translations of Swedenborg's works, which were executed by J. P. Moet, and published by John Augustus Tulk. In England, Swedenborg has long had a number of readers, of whom the most celebated is the Rev. George Jeffreys, Bishop of London; and through the English translations of Swedenborg's works, which were executed by J. P. Moet, and published by John Augustus Tulk.

Several of the British Colonies. There is more than a suspicion that the opinions of the Rev. Fode of Oxford, and of the Rev. Brideg, of St. John's, Manchester, and the Rev. William Hill, are the first translators of the Swedenborgian doctrines. Some of these works are printed in Sweden, and have reached many members, and even clergymen, of the Church of England.

The Rev. Thomas Hartley, rector of Winwick, in Northumberland, the Rev. John Clowes, rector of St. John's, Manchester, and the Rev. William Hill, are the first translators of the Swedenborgian doctrines. Some of these works are printed in Sweden, and have reached many members, and even clergymen, of the Church of England.

'The Articles of Faith of the New Church signified by the New Jerusalem in the Revelation, are these:—

1. That Jehovah God, the creator and preserver of heaven and earth, is himself both wisdom, and truth itself, and good itself and truth itself: that he is one both in essence and in person, in whom, nevertheless, is the Divine Trinity of Father, Son, and Holy Spirit, which are the essential divinity, the Godhead, or the eternal nature of Jehovah, the preserver of the heaven, and the source of all good beginning with Jehovah, the Father; and the wisdom of Jehovah, the Son; and the Holy Spirit, the soul of Jehovah; and the law of Jehovah, the Spirit of Jehovah; and the wisdom of all things, the Spirit of all things, the holy soul of all things, the eternal soul of all things, the eternal life of all things, the eternal power of all things, the eternal spirit of all things, the eternal wisdom of all things, the eternal goodness of all things, the eternal truth of all things.

2. That Jehovah God himself descended from heaven, as divine wisdom, as the Word, and as the bright celestial man, for the purpose of removing from man the powers of hell, and restoring to order all things in the spiritual world, and all things in the church: that he removed from man the powers of hell, by conflicts against and victories over them; in which consisted the great work of redemption: that by the same acts, which were his temptations, the last of which was the passion of the cross, he was united, in his humanity, divine truth to divine good, or divine wisdom to divine love, and so returned into his divinity in which was united, from out of his glorified humanity, and his glorified humanity: whence he for ever keeps the infernal powers in subjection to himself: and that all who believe in him, with the understanding, from the heart, and the soul, shall be saved. 3. That the Sacred Scripture, or Word of God, is divine truth itself, containing a spiritual sense herefore unknown, whence it is divinely inspired and holy in every syllable: as well as a literal sense, which is the basis of its spiritual sense: that the last sense of the Sacred Scripture is its sanctity, and its power: thus that it is accommodated to the apprehension both of angels and men: that the spiritual and natural senses are united, by correspondences, like soul and body, every natural expression and image answering to, and including, a spiritual and divine idea, just as that the Word is the medium of communication with heaven and of conjunction with the Lord.

4. That the government of the Lord's divine love and wisdom is the divine providence: which is universal, exer-
cised according to certain fixed laws of order, and extending to the minutest particulars of the life of all men, both of the good and the evil: that in all its operations it has respect to what is infinite, the eternal, and makes no account of things transitory but as they are subservient to eternal ends: thus, that it mainly consists, with man, in the connexion of things temporal with things eternal; for that the continual aim of the Lord, by his divine providence, is to join man to himself and himself to man, that he may be able to give him the felicities of eternal life: and that the laws of permission are also laws of the divine providence; since evil cannot be prevented without destroying the nature of man as a proper creature, he cannot live in spiritual communion removed unless it be known, and cannot be known unless it appear: thus, that no evil is permitted but to prevent a greater; and all is overruled, by the Lord’s divine providence, for the greatest possible good.

5. That man is a living thing, but is only a recipient of life from the Lord, who, as he loves itself and wisdom itself, is also life itself; which life is communicated by influx to all in the spiritual world, whether belonging to heaven or to hell, and to all in the natural world; but is received differently by every one, according to his quality and consequent state of reception.

6. That man, during his abode in the world, is, as to his spirit, in the midst between heaven and hell, acted upon by influence from both, and the equilibrium between good and evil; in consequence of which he enjoys free will, or freedom of choice, in spiritual things as well as in natural, and possesses the capacity of either turning himself to the Lord and his kingdom, or turning him self to the contrary; is the cause of either progression or regression in the kingdom of darkness: and that, unless man had such freedom of choice, the Word would be of no use; the church would be a mere name; man would possess nothing by virtue of which he could be conjoined to the Lord; and the cause of all his trouble on earth.

7. That man at this day is born into evil of all kinds, or with tendencies towards it; that, therefore, in order to his entering the kingdom of heaven, he must be regenerated or converted, that is, his spiritual nature must be affected in a progressive manner, by the Lord alone, by charity, faith, and freedom of will, as mediums, during man’s co-operation: thus as all men are redeemed, all are capable of being regenerated, and consequently saved, every one according to his state; and that the regenerate man is in communion with the angels of heaven, and the unregenerate with the spirits of hell: but that no one is condemned for hereditary evil, any further than as he makes it his own by actual life; whence all who die in infancy are saved, special means being provided by the same wight, which is the name of the whole power of heaven, that, to this end, all evils, whether of affection, of thought, or of life, are to be abhorred and shunned as sins against God, and because they proceed from infernal spirits, who in the aggregate are called the Devil and Satan; and that good affections, good thoughts, and good actions are to be cherished and performed, because they are of God and from God: that these things are to be done by man as of himself; nevertheless, under the acknowledgment and belief that it is from the Lord, and with the acknowledgment and belief that man shuns evils as sins, so far they are removed, remitted, or forgiven: so far also he does good, not from himself, but from the Lord; and in the same degree he loves truth, both faith, and is a spiritual man: and that the Decalogue teaches what are the laws of these things.

8. That charity, faith, and good works are unitedly necessary to man’s salvation: since charity, without faith, is not spiritual, but natural; and faith, without charity, is not living, but dead; and both charity and faith, without good works, are merely mental and not spiritual; and that good works without use or fixedness: and that nothing of faith, of charity, or of good works is of man, but that all is of the Lord, and all the merit is his alone.

9. That baptism and the Holy Supper are sacraments of divine institution, and are to be permanently observed: baptism being an external medium of introduction into the church, and a sign representative of man’s purification and regeneration; and the Holy Supper being an external meidium, to those who receive it worthily, of introduction, as to spirit, into heaven, and of conjunction with the Lord; of which also it is a sign and seal.

11. That immediately after death, which is only a putting off of the material body, never to be resumed, man rises again in a spiritual or substantial body, in which he continues to live to eternity: in heaven, if his ruling affections, and hence his life, have been good; and in hell, if his ruling affections, and hence his life, have been evil.

12. That now is the time of the second advent of the Lord, which is a coming, not in person, but in the power and glory of his Holy Word: that it is attended, like his first advent, with the calling of many to eternity; through the spiritual world, where the wonderful divine operation, commonly expected under the name of the Last Judgment, has in consequence been performed; and with the preparing of the way for a New Church on the earth,—the first Christian Church having spiritually come to its end by the corruption of evils of life and errors of doctrine, as foretold by the Lord in the Gospels: and that this New or Second Christian Church, which will be the Crown of all Churches, and will stand for ever, is what was represented even by John, while he beheld the holy city, New Jerusalem, descending from God out of heaven, prepared as a bride adorned for her husband.

(For further particulars see Reports of the Society for Printing and Publishing the Word of the Holy Scriptures. London, 1810; Reports of the London Missionary and Tract Society of the New Jerusalem Church, to the Tract Society. New York, 1849; Minutes of the General Conference of the New Church, signed by the New Jerusalem Church. New York, 1849; Magazin für die wahre Christliche Religion, pp. 1 to 70, Tubingen, 1841, which contains an elaborate account of all the Swedishborgian periodicals.)

SWEET BRIAR, [see BAY.]

SWEET CALAMUS. Reference has been made from NARDUS and SCHENANTHUS to SPIKENARD, and to this article from SPIKENARD, because under this name two very different substances have been confounded, which are: the one, a plant possessing an aromatic gum, called the resin of the Nardus; the other, a plant possessing a gum aromatic, which was known by the name of Sparangium or Sprengel. The latter gum is included in the less ample name of Malpighia. The former gum is called by Dioscorides, and known by the name of Lemon-Grass. This gum has also the names of Camel’s Hay, pala de mecha, &c. applied to it. Schenanthus is evidently compounded of Schenuus and Anthis (ανθος, a flower). Theophrastus treats of two species of this gum, which are said to have been found among the mountains of Lebanon, on the shores of an extensive lake; but Burchardt in such situations could only find rushes and reeds. It is possible therefore that a Syrian locality may have been assigned to drugs obtained from the resin of this gum, and belonging to the genus of Schoenanthus. The gum of the Schoenanthus species is used in the production of India. By Hippocrates they are called ellamos, teinos, and Xylios, also ελαμος, ελιος, ελυ, &c. The gum of this plant is said to be agreeable to the use, and possessing some resemblance in nature. If we desire to find something similar to Schoenanthus, and possessed of still more aromatic properties, we have only to search in the genus to which this belongs, and find several species which have all the agreeable odors. The roots of Andropogon muricatum, commonly known in the shops of this country by the name of the Tamul name (Brestovou) and made into small bundles for brushing velvet, are remarkable for their fragrance; hence several essences are now assigned to drugs obtained from them in Paris. The
roots are also well known to Indians by the name of Khu&kkus, both grant, Blane and Khu&kkuus, the best known. The infusion of its leaves is often employed in India as a pleasant stomachic, and Lemon-Grass oil is probably distilled from them. A. Nardus? is another species, called Ginger, or Spikenard, and it is much used in the Courtall Hills and the Indian Peninsula, where the natives occasionally prepare with it an essential oil useful in rheumatism, and use the infusion of its leaves as a stomachic. A. Iravancausa is a species which comes near A. Schumannius in habit and taste. It skirts the bases of the mountains of north-west India, and was found by Dr. Blane and by Dr. Boyl about Hurdwar: it was considered by the former to be the spikenard of the ancients. Dr. Roth also considered it to be of importance, and in the upper part of the Doab of the Ganges and Jumna rivers, he states (Illustr. Himal. Bot. p. 425) that it is there called miricha-gund, with tzhihar given as its Arabic, and tzhiano as its Greek synonyme; and infers that it may have been the sxuvus of the ancients. Schumannius is still more extensively diffused, and still more remarkable for its very powerful and delightful fragrance. This is the species which yields the Grass Oil of Central India, commonly called Oil of Spikenard. It extends southwards between the Ganges and Nangna, and northwards to the Delhi territory, but probably still farther north, as it delights in a dry and barren soil. In Central India, especially at Namur, Elliehpore, &c., a very delightful fragrant oil is distilled near it from which is highly esteemed, and in the British Museum, being added to the finer expressed oils employed for Anointing the hair or the bodies of the natives. It is also much esteemed as an external application in rheumatism, and has been introduced into practice in this country, and is highly valued by some, though unknown to the generality of practitioners. It has the advantage of diffusing an agreeable odour at the same time that it is efficacious as a stimulant remedy. This or the preceding species extends into Afghanistan.

Sweet Cane, or Calamus, being described by Dioscorides immediately after sxuvus, which is generally acknowledged to be Andropogon Schumannius, appears to Dr. Royse to belong to the same genus, and indeed to be the above species. Dioscorides says that the genus is thought also to be the 'sweet cane' and the rich aromatic reed from 'a far country' of Scripture: he states there is no plant which more closely coincides in description with everything that is required, than the tall grass which yields the fragrant grass-oil of Central India, and which he has named Andro- pogon Calamus aromaticus. (Illustr. Himal. Botany, p. 425.)

SWELL, [ORGAN]

SWIETEN, GERARD VAN, was born at Leyden in 1700. He received his general education there and at Louvain, and studied medicine at Leyden under Boerhaave, of whom he soon became the favourite pupil, and by whose influence he was appointed to a professorship of medicine very soon after taking his diploma of doctor in 1725. His lectures, which were very extended, and against him on the ground of his being a Roman Catholic, and he was obliged to resign his chair. In 1745 Maria Theresa of Austria appointed him her first physician, and in the capacity he used his influence to establish a school, of clinical instruction at Vienna, to rebuild the university, and accomplish many other important measures for the advancement of science. During eight years also he lectured on the Institutes of Boerhaave. He died in 1772, and Mr. Bland estimated his fees at 20 to 25 guineas a year. The 'Father Willoughby, Jonathan. Adam, and three others, of whom Godwin, William, Jonathan, and Adam settled in Ireland; he had also four daughters. Dryden was named after his mother, who was a near relation of Dryden the poet. Jona- than. Adam, in 1665 was appointed to establish a school at Abigail Erick, of an ancient family in Leicester-shire, but poor. He was bred to the law, and in 1665 was appointed to a small profession at small-work.
The steward of the King's Inns, Dublin. He died in 1667, leaving his widow in great poverty, with an infant daughter, and pregnant with the future dean of St. Patrick's.

Jonathan Swift was born in Dublin, November 30, 1667. When about a year old, he was carried to Whitehaven, in Cumberland, to the house of Lord Capel, his uncle Godwin, who was a lawyer, and was supposed to be rich. Jonathan, when six years old, was sent to the school of Kilkenney, whence he was removed to Trinity College, Dublin, where he was received as a pensioner, April 24, 1682. In course of time education and support were supplied him by the Rev. John Godwin, who, however, supplied him with the means of subsistence in so niggardly and ungracious a manner, that Swift ever afterwards spoke of him with great asperity. Before Swift's education was completed, Godwin died, and it was then discovered that he had for some time been in embarrassed circumstances, the result of unsuccessful speculations. The charge of Swift's education now devolved chiefly upon his uncle William, of whom he always spoke with affectionate gratitude as 'the best of his relations;' not that he was much more liberally supplied with money than he had been by Godwin, for William was also in difficulties, but for the kindness with which it was bestowed. The degree of B.A. was conferred on him in 1710, and his posthumous father was passed out of office, as himself says, speciali gratuli, which, he informs us, was, in Trinity College, a discernible intimation of scholastic insufficiency. Indeed there is abundant evidence that he had not only neglected the study of the school logic which was then required, but that there was a complete absence of all study. Then, however, Swift was not altogether dissatisfied with his education, which, as himself says, was a perfect and merciful remedy for his meagre and lachrymose state of mind, for the breaking out of the war in Ireland, he passed over into England, and travelled on foot to Leicester, where his mother had been residing for some years in a state of precarious dependence. According to her relations, one story was told, of Sir William Temple, whose seat was Moor Park, near Farnham, in Surrey.

Swift, after residing some months with his mother, waited upon Sir William Temple, by whom he was received with kindness, and was admitted into his family. From this time Swift's careless and idle habits were entirely abandoned; he studied eight hours a day, and became useful to his patron as his private secretary. A surfeit of stone-fruit, to which Swift always averse, was supposed to have been the cause of his illness, which, however, did not prevent him from making the best of his education at Oxford. Better acquaintance was formed in the family of Sir William Temple, by course of his state of dependence, and in some degree disaffected with his patron. He made his complaint to Sir William, who then offered him a situation worth £100 a year in the Rolls in Ireland, of which Sir William was Master of the Rolls. Swift offered to go to Ireland, and endeavouring to obtain pre-ferment in the church. They were both displeased, and so parted. Swift went to Ireland, but was deeply mortified when he found that he could not obtain orders without a certificate from Sir William, which he was therefore compelled to solicit from his offended patron. The certificate was given; Swift was admitted to desen's orders, October 18, 1694, and to priest's orders, January 13, 1695. Soon after marriage, Swift moved to Ireland, and was appointed a canon in the cathedral of Kilroot, in the diocese of Down, worth about £100 a year, which he immediately went to perform the duties of a country clergyman.

Sir William Temple appears to have soon felt the want of Swift's service. Swift, after residing a short time in Ireland, was ordered to return to London, and Swift, on the other hand, however fond of independence, must have felt strongly the contrast between the dull life of an Irish clergyman in a remote town in Ireland and the refined society of Moor Park. He did not hesitate to accept Sir William's invitation; and having become acquainted with a learned and worthy curate in his neighbourhood, who had a family of eight children, and only 40, a year, he rode to Dublin, resigned his prebend, and obtained a grant of it for his poor friend.

Swift, on his return to Moor Park in 1695, was treated by Sir William Temple rather as a friend than as a mere secretary, and they continued to live together till Sir William's death, January 27, 1698. Some time before his death, Temple had obtained from King William a promise that Swift should have a prebend of Canterbury or Westminster; Sir William also left him a legacy, with the task of editing his works. Swift went abroad as deacon's chaplain for nine months, and was present at the peace of Utrecht, 1713. His health, however, had been so much injured by his residence in the Low Countries, that when he returned to Ireland he was unable to engage in any benefit which might arise from the publication of them.

During the early part of his residence at Moor Park, Swift wrote some Pindaric Odes, which he is said to have shown to Dryden, who, after having read them, said, that if there was ever to be a poet, his name was to be Swift. They were afterwards published, and the second edition, with improvements, was sent to Dr. Swift, who was at that time out of Ireland.

The Battle of the Books in St. James's Library, in support of Sir William Temple, and in opposition to Dr. William Wotton and Dr. Bentley. A dispute had arisen in France as to the superiority of antient or of modern writers: the dispute passed over to England, and the cause of the moderns was supported by Wotton, in his Reflections on Antient and Modern Learning. Temple took the side of the anti-antients, and the dispute passed over to England, but unfortunately provoked the Epistles of Phalaris, which Bentley, in an Appendix to the second edition of Wotton's Reflections, proved to be spurious. Swift's work is a vindication of Wotton's in a spirited and animating style. It was not published however till after Sir William's death. Swift is supposed to have likewise finished about this time his Tale of a Tub, a satirical allegory, in ridicule of the corruptions of the church of Rome and the errors of the heretics in the church of England, though not without an occasional touch at her faults also. This is one of his most published and perfect works. Though he completed it at Moor Park, there is evidence that he had sketched it out roughly at Trinity College.

It was during Swift's second residence at Moor Park that the acquaintance commenced between him and Miss Esther Johnson, more generally known by the poetical name which he gave to her of Stella (the Star). Her father was a London merchant, and her brother, Sir Charles William Temple, according to Sheridan. He might have been both—unfortunate in business, and Sir William's friend afterwards. He died soon after Stella's birth. Her mother lived with Lady Gifford, Sir William Temple's sister, who, with Mrs. Johnson and her daughter, resided at this time at Moor Park. Miss Johnson was then about thirteenth years of age, and Swift about thirty. He assisted in her education, which appears to have been little attended to previously, and she seems to have acquired a fondness for Swift. Swift however, some years previously to his acquaintance with Miss Johnson, had professed an attachment to Miss Jane Waring, on whom he bestowed the title of Varina: she was the sister of a fellow-student at Trinity College; and between them was a story of covert, cold, and gave a temporary refusal on the plea of ill health. By degrees, as Swift's passion abated, hers grew warmer, and she wrote to express her willingness to accept his former offer.
Swift did not refuse to fulfill his promise, but in his reply laid down such conditions as to the duties of her who should become his wife that no further correspondence took place between them.

After Sir William Temple's death Swift repaired to London, to superintend the publication of his patron's posthumous works, which he performed carefully, and prefixed a Life of Sir William and a dedication to the king; but, finding that the king took no notice of the Works, the dedication, or himself, he accepted an offer made to him by Lord Berkeley in 1699, which was an honorable position at the Court of Ireland, to attend him there as his chaplain and private secretary. He acted as secretary till they arrived in Dublin, when a person of the name of Bush obtained the office for himself by representing to Lord Berkeley the unfitness of such an appointment for a clergyman and officer of a clergymen. Lord Berkeley however, to compensate Swift for the loss of his office, promised that he should have the first good prebend in his gift that he became vacant. To this arrangement Swift assented. The rich dower of Mrs. Bush was soon afterwards at Lord Berkeley's disposal, and Swift intimated to him that he expected to keep his word. Lord Berkeley told him that Bush had obtained the promise of it for another, but, observing Swift's indignation, advised him to apply to the king. He did so, but, when the secretary frankly told him that 1000l. had been offered for it, but that if he would put down the same sum he should have the preference. Swift, in a rage, exclaimed, 'God confound you both! I would be a chaplain in England immediately; I will have the castle, intending to return no more. Lord Berkeley however was unwilling, if it could be avoided, to risk exposure: he therefore offered to him the rectory of Agher and the vicarages of Laracor and Rathbeggan, in the county of Meath. This was a third of the deanery, as they only amounted together to 230l. a year, Swift deemed it prudent to accept the livings: he still retained his office of chaplain, and continued to reside with the family till Lord Berkeley died. The lord of Dunlavin was besought upon him in 1700, which increased his income to between 350l. and 400l. a year. While he resided in Lord Berkeley's family he produced some of the first specimens of that original vein of humor which, more than perhaps any other of his rare talents, his reputation is founded: among these are 'The Humble Petition of Franchise Harris,' and the 'Meditation on a Broomstick.'

About this time Swift's sister married a person of the name of Wogan, who had adopted a spirit of independence against this marriage, and when it took place, he was highly offended. Scott, on the authority of Theophilus Swift, says that Fenton was a worthless character, on the point of bankruptcy at the time, and that Swift afforded his sister a maintenance, and went as a gentleman in the destination which her imprudence brought upon her. In the year 1700, on the return of Lord Berkeley to England, Swift took possession of his living at Laracor. He performed his duties with a peculiar diligence, and expended a considerable sum in repairing the church. Some years afterwards he purchased for 230l. the tithes of the parish of Effernock near Trim, which he left by his will to the vicars of Laracor for the time being, as long as the dean and episcopal residence continues to be the established faith in Ireland; but if any other form of Christian religion becomes the established faith, he then directs that the profits as they come in shall be paid to the poor of the parish of Laracor.

Swift had not been long at Laracor when it was arranged between Miss Johnson and himself that she should come to reside in his neighbourhood. She had a small independence, about 1500l. of which 1000l. had been left to her as a legacy by Sir William Temple, since the day she was taken from her father's Rod. She was the widow of the Temple family, a widow of middle age, whose income was only about 25l. a year. Mrs. Johnson continued to reside with Lady Gifford. When Miss Johnson removed to Ireland she was accompanied by Miss Johnson, and the only reason for leaving England on the part of both was that the rate of interest was much higher in Ireland: it was then 10 per cent. They took lodgings in the town of Trim, where they generally resided, except in Swift's absence, when they occupied the vicarage-house. Miss Johnson was then at least eighteen years of age: her features were beautiful, her eyes and hair black, and her form symmetrical, though a little inclined to fullness. She was a woman of strong sensibility, though not highly educated, of agreeable conversation, and elegant manners.

Swift appears to have passed over to England at least once a year and remained two or three months, chiefly in London, where he officiated as chaplain in Lord Berkeley's family, but generally paid a visit to his mother at Leicester. In 1701, during the first of these annual residencies in England, he published his first political tracts, 'A Discourse on Conjugal Love' and 'A Vindication of the Ministers and Commons at Athens and Rome.' It was intended to check the popular violence which had occasioned the impeachment of Lords Somers, Halifax, Oxford, and Portland for their share in the Partition Treaty. It was published anonymously.

On his second visit to England, in 1702, he avowed himself to be the author of this tract, and was immediately admitted into the society of the leading Whigs, Somers, Halifax, and Sunderland, and also into that of the Ascendancy: Addison, Steele, Arbuthnot, and others, who used them to assemble at Buenos Coffee-house.

In 1704 Swift published anonymously the 'Tale of a Tub,' together with 'The Battle of the Books.' The 'Tale of a Tub' he regarded as a 'whimsical piece,' which 'the wit was much admired, but it made him some powerful enemies by its imputed irreligious tendency.

In 1705 Swift was employed by the Irish prelates to solicit a remission of the first fruits for Ireland, which had hitherto been paid regularly, and immediately to remit his pay. His application was made to Lord Godolphin, but was unsuccessful. About this time there were two or three plans for Swift's preferment, but all of them were failures. He was offered the bishopric of Derry, but he had been already recommended to ViscOUNT BURLINGTON by Berkeley. Swift found himself too infirm to venture upon the employment: he was to have gone out to Virginia as a sort of metropolitan over the colonial clergy in America, but neither did this appointment take place; but he promised Dr. South that he would pay the expenses of his journey, but South, though very old, continued to live for several years longer.

During the years 1705 and 1706 Swift published several tracts. 'An Argument against abolishishing Christianity,' was published in 1705, and was followed by 'A Vindication of His Alleged Religion,' which was dedicated to Lady Berkeley, who was a woman of strict piety, highly respected by Swift: it is the only work to which he ever put his name: it made a strong impression on the religious classes, and was very favourably received by the Protestant parliament. In his 'A Vindication of the Church-of-England Man,' as well as some of his lighter pieces, especially the humorous attacks on Partridge the almanac-maker, which came out under the name of Isaac Bickerstaff, he also put an end to the 'Tale of a Tub.'

In 1710 Swift was again, in conjunction with the bishops of Ossory and Killala, to solicit the boon. On the 1st of September, 1710, he left Ireland on this mission, but found, on his arrival in London, that the bishops, who had gone to England before him, had left that country without having obtained the boon.

Swift now found himself courted by the leaders of both parties, with the exception of Godolphin, who treated him with such marked coldness that he vowed revenge, a vow which he performed on the 1st of October, by the publication of 'A Tale of a Tub.' Swift was again detained, in conjunction with the bishops of Ossory and Killala, to solicit the boon. On the 1st of September, 1710, he left Ireland on this mission, but found, on his arrival in London, that the bishops, who had gone to England before him, had left that country without having obtained the boon.

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During the 1710 Swift's mother died. 'If this be the way to heaven,' said he, 'be through piety, truth, justice, and charity, she is there.'

On the change of ministry in 1710 the hopes of the Irish prelates were again revived for a remission of the first-fruits; and Swift was again deputed, in conjunction with the bishops of Ossory and Killala, to solicit the boon. On the 1st of September, 1710, he left Ireland on this mission, but found, on his arrival in London, that the bishops, who had gone to England before him, had left that country without having obtained the boon.

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in a series of letters to Miss Johnson and Mrs. Dingley, but obviously intended for the former. This Journal, written as it was chiefly in the morning and evening of each successive day of the most busy part of Swift's life, affords a picture as minute as it is evidently trustworthy of the events in which he was concerned and the thoughts which arose out of them.

The Examiner, a weekly periodical, had been begun by St. John, Prior, and others, in support of the new ministry. Thirteen numbers had been published with little effect, when on Nov. 29, 1710, a shift of indignation took place, and in his invocation of the house, by which he had made an apology. After the attempt upon the life of Harley by the Marquis de Guiseard, he was created lord treasurer and earl of Oxford, in May, 1711, and offered to make the same offer to another person of the same name. And this will be no man's chaplain alive," says he in his Journal. He evidently thought that his services and his uritis deserved no worse a place than a bishopric. He continued, as long as he remained in England, to be treated, both in private and public, with the greatest civility and respect, by Lord Oxford, and also by St. John, who, in July, 1712, was created lord Bolingbroke. He formed the society of Brothers, which consisted of sixteen persons of the highest rank and most distinguished talents among the Tories, of which he was president. He was chairman of members in the House of Commons with facts and arguments, while the Whigs in the Lords threatened to bring the author to the bar of the house. The effect upon the public mind was such as to produce a determined spirit of opposition to the queen's government. He was re-elected to the same seat in the House of Commons, and some years after was a member of the House of Lords.

It having become obvious that the existence of the Tory government depended upon making peace with France, Prior was sent to Paris to enter into a negotiation for that purpose. The St. John's furtherance of the same object, wrote "The Conduct of the Allies," which was published anonymously, November 27, 1711, while the question of peace or war was under discussion in parliament. The sale of this tract was unprecedented at that time, four large editions having been exhausted, but it was not published till 1729, seven years after his death. The only work unconnected with politics which Swift produced during this busy period of his life, was his letter to the earl of Oxford, containing "A Proposal for correcting, improving, and ascertaining the English Tongue," the object of which was to be, as he was aware, by a society similar to that of the French Academy. Swift was very anxious to have this scheme carried into effect, but Oxford was too busy at that time to second his views, which indeed met with little favour from the public. Yet there were many who obtained nothing for himself but empty honour, a species of reward which hardly any man ever valued less. He was too proud to make any direct solicitation; he was aware that Lord Oxford well knew what he cherished, but he was not aware that he had a private and obstinate enemy in Queen Anne, who had been taught by Archbishop Sharp that the supposed author of the 'Tale of a Tub' was little, if at all, better than an infidel. He now felt that his situation was uncomfortably awkward, and began to anticipate that he might be unwilling to return to Ireland neither higher in the church nor richer than he left it. He became impatient and restive. The bishop of Hereford became vacant, and Oxford and Lord Masham, the queen's favourites, exerted themselves to obtain her consent to bestow it upon him, but the opposition of the duchess of Somerset, the queen's other favourite, whom Swift had labelled in his 'Underworld' as her majesty's 'false prophet,' blocked the road. As soon as Swift knew that the bishopric had been given to another, he sent notice to Lord Oxford of his determination to retire. The ministry now saw, that unless something were done for him, he could lose his powerful aid, which had kept their enemies at bay. He therefore petitioned the Queen, but weakly. She had left England, and was in possession of the government. Thus pressed, Oxford, with the concurrence of the duke of Ormond, proposed that Dr. Sterne should be removed to the bishopric of Dromore, a vacant See for Swift in the deanery of St. Patrick's. This they accomplished; and, and, with the view of retaining him in England, an effort was made by Oxford and Lord Masham to exchange the deanery for a Windsor prebend; but the queen's determination against this arrangement was not to be shaken. The warrant for the deanery of St. Patrick's was signed February 23, 1713, and early in June the same year Swift set out for Ireland to take possession.

In the early part of his Journal, Swift expresses a continual desire to keep himself and his society of his beloved Stella, but this feeling evidently becomes gradually weaker. The splendid society in which he moved, and the sort of homage with which he was treated, such as perhaps a man of his rank ever had, had its effect upon his return to Ireland, taken strong possession of his heart; so that when he entered into the possession of his deanery, it was with feelings in the highest degree dissatisfied and desponding.

Swift was sorely settled in his deanery when he received the most pressing invitations from the friends of the Tory administration to return to England, for the purpose of reconciling, if possible, Oxford and Bolingbroke, whose dissension endangered the very existence of the Tory government. He felt himself, however, bound either to return to Ireland, and soon afterwards published 'The Public Spirit of the Whigs,' a bitter attack on Steele as well as the party to which he belonged. In this pamphlet the Scotch were spoken of as 'a poor fierce northern people,' with several other offensive remarks, directed especially against the duke of Argyll. A prosecution was instituted against Barber the printer, which the ministers managed to set aside, but the Scotch peers went up in a body to complain to the queen of the indignity they had suffered.

Finding that Oxford and Bolingbroke could not be reconciled, Swift retired to the house of the Rev. Mr. Gayry, Upper Letcombe, Berkshire, at the beginning of June, 1714. Here he wrote his 'Free Thoughts on the State of Bridgewater Affairs,' which contained a severe attack on the duchess of Somerset, and was not read by Oxford, and left no means untried to conciliate Swift. The queen, at Bolingbroke's earnest request, signed an order on the treasury for 1000l., which Swift had in vain endeavoured, at the first fruits, to relieve him from the debts, amounting to at least that sum, which he was obliged to incur on entering his deanery. This sum however he never received, the death of the queen having occurred before the order was presented for payment. At the same time Lady Masham wrote to him, conjuring him not to desert the queen, and Barber was commissioned by Bolingbroke to say that he would reconcile him to the duchess of Somerset. Almost the next post brought a letter from Lord Oxford, now dismissed and going alone to his seat in Hereford, where he was to retain himself, and to leave his affection for Lord Oxford did not allow him to hesitate a moment in accepting the invitation of the disgraced minister, and he wrote immediately to Ireland to get an extension of his leave of absence, which was now nearly expired. Within three days the death of Queen Anne and the accession of George I. put an end to the power of the Tories. Lord Oxford was arrested and imprisoned, and Swift wrote to him with a touching earnestness to have him, before his death, come to him, so that his death might be a comfort to him in his confinement. Lord Oxford however refused to accede to his request. Bolingbroke and Ormond fled to France, and Swift returned to Ireland.

Not long after Swift came to London to solicit the remission of the first fruits, he was introduced to the acquaintance of Mrs. Vanhomrigh, the widow of Bartholomew Van...
homrgh, a Dutch merchant, who, at his death, had left to his widow a life interest in 16,000l., which sum was afterwards to be divided equitably among the children, two sons and two daughters.

When Swift became intimate in this family, Miss Esther Vanhomrgh, the eldest daughter, was under twenty years of age, not remarkable for beauty, but well educated, lively, graceful, spirited, and, unfortunately for reading his history, of a capricious temper. She was devoted to her studies, and their friendly intercourse was continued till Miss Vanhomrgh made a declaration of affection for him, and proposed marriage. How that declaration was received is related in Swift's poem of 'Cadenus and Vanessa.' Cadenus (or Cashel) is the title of the poem, and Vanessa is the poetical name which he gave to Miss Vanhomrgh. The proposal was declined; but Swift, from vanity or fondness, or both, had not firmness enough to relinquish the affectionate intercourse.

After his return to Ireland, Swift, conscious of his imprudence, endeavoured to limit, as much as possible, the correspondence between himself and Vanessa, probably expecting that her attachment would be diminished by absence; but hers was a deep and uncontrolable passion. She wrote to him frequently, and complained bitterly of his not replying to her letters. At length Mrs. Vanhomrgh died; her two sons died soon afterwards: and the circumstances of the two sisters being somewhat embarrassed by imprudent expenditure, to rescue them from poverty, the Governor of Cashel, who was the father, had left a small property near Celbridge. Swift, in his diary, though he mentions occasionally his calling at Mrs. Vanhomrgh's, makes no allusion to her daughter.

No doubt there was caution on the part of Vanessa; the intercourse between Swift and Vanessa had reached Stella soon after its commencement.

In 1714 Vanessa arrived in Dublin, to the annoyance of Swift and dread of Stella. Swift saw her very seldom: he introduced Dean Winter to her, a gentleman of fortune, as a suitor for her hand; and proposals of marriage were made to her by Dr. Price, afterwards bishop of Cashel; but both offers were rejected. Stella's jealousy at length became so restless, that Swift is said to have consented to their marriage, and the ceremony was performed in the garden of the house of the bishop of Clogher; and though Swift never acknowledged the marriage, and no change took place in their intercourse, the evidence, though imperfect, is such as to leave little doubt of the fact. At length, in 1717, Vanessa and her sister retired to Marley Abbey, near Celbridge, where Swift does not appear to have visited them till 1720, when Vanessa's sister became dangerously ill: during that illness his visits were frequent, and were continued occasionally to Vanessa's as well. Stella's degrees of jealousy became more impatient, and at length wrote to Stella, to inquire into the nature of her connection with Swift. Stella, highly indignant, sent the letter to Swift, and immediately retired to the house of Mr. Ford, near Dublin. Swift, in a passion, rode instantly to the house of the bishop of Clogher. Vanessa, on his entering the room, was stuck dumb by that awful sternness which his countenance assumed when he was in anger, and to which she more than once alludes in her letters to him. He flung the letter on the table without saying a word, instantly left the house, and rode back to Dublin.

Poor Vanessa sank under the blow. In a few weeks afterwards she died, in 1723, leaving her property to Dr. Berkeley, afterwards bishop of Cloyne, and to Mr. Marshal, one of the judges of the Irish court of Common Pleas.

The poem of 'Cadenus and Vanessa' was published soon after Miss Vanhomrgh's death; but Berkeley is said to have destroyed the original correspondence: a full copy has remained in the possession of Mr. Marshal, and it was published for the first time (with the exception of one or two letters) in Scott's edition of Swift's Works.

Swift, in an agony of shame and remorse, retreated to some place in the south of Ireland, where he remained two months, with a taste for reading and the agreeable society of children. On his return to Dublin, Stella was easily persuaded to forgive him. After their reconciliation, Stella continued to be the friend of Swift, the companion of his social hours, his confidant and patient attendant in sickness; and she preserved until his death a kind attachment to Marley Abbey. Vanessa alone took her up: their union as husband and wife was merely nominal.

In 1729 Swift published 'A Proposal for the Universal Use of Irish Manufactures.' This honestly-meant tract was represented as a sodic libel: the printer was brought to trial: the verdict of the jury was 'Not guilty;' but Judge Whitaide kept them eleven hours, and sent them back to re-try the case. Mr. Swift died some time later, unrenowned and unsung. His children were admitted, as were the hands of a special verdict: the public indignation however was roused, and the government, by a 'nolle prosequi,' were obliged to relinquish the contest.

In 1723, there being a scarcity of coined money in Ireland, George I. issued a patent for 100,000l. in the form of forgeries and halfpence to the amount of 105,000l. The grant was made without consulting the lord-lieutenant or privy council of Ireland: it had been obtained by the influence of the duchess of Kendal, the king's mistress, who was under a commission from the king to manage the trade of the famous job. The Irish parliament expressed their dislike to it by a remonstrance, of which no notice was taken, when a voice was heard which apparently arose from one of the trading classes; a letter was published signed 'M. During (Draper) (draper), Dublin,' and was followed by five or six another.

The effect of these letters is known. All Ireland was roused. No one would touch the contaminated coin. A reward of 300l. was offered for the discovery of the author of the Draper's fourth letter. A bill was then to be presented to the grand jury, when the Dean addressed to them 'Some reasonable Answer;' and the memorable quotation from Scripture was circulated, 'And the people said unto Saul, shall Jonathan die, who hath brought this reproach to Israel. Behold, it is not he, but the son of Jonathan that there shall not one hair of his head fall to the ground; for he hath wrought with God this day. So the people resolved Jonathan that he died not.' The grand jury wrote 'gomeVIC.'

In 1724, the Draper was actually indicted for murder, and was tried, condemned, and hanged, in consequence of his letters. The Draper's head was pointed on signs of the merchant, clad in copper plate. On medals, woven on pocket-handkerchiefs. As if to shelter himself from this storm of public applause, he retired with Stella and Mrs. Dingley to Quilca, a country-house belonging to Dr. Sheridan, in a retired situation about seven miles from Cashel, with a garden of fifty acres, by the banks of the river, the company of Dr. Sheridan and other friends, and produced several light pieces of humour, in which he was assisted by Sheridan, who followed him at no great distance. He also occupied himself in revising and completing the Travels into several remote Nations of the World, by Lemuel Gulliver.

In 1726 Swift visited England again, for the first time since Queen Anne's death. Bolingbroke was now returned to the English parliament; and Swift's old friend, who had been in the same house, was now at the head of the government, but made frequent visits to Dawley, the residence of Bolingbroke. His other associates were chiefly Arbuthnot, Gay, and Lord Bathurst.

At this time the Prince of Wales, afterwards George II., and the Prince of Wales, afterwards Queen Caroline, kept a sort of court at Leicester House. The favourite of the princess was Mrs. Howard, afterwards Countess of Suffolk, Pope, Gay, and Arbuthnot were frequent attendants at this court. Swift was introduced to the princess by Arbuthnot, at her own particular request. His visits afterwards were frequent, especially when she resided at Richmond, but always by special invitation from the princess.

In July, 1726, the Dean received letters informing him that Stella was in a state of dangerous illness. He hastened to Ireland, and was gratified, on his arrival in Dublin, to find that her health was better. He now made the world acquainted with the Travels of Gulliver.' The work was published in London, anonymously as usual, through the recommendation of Pope. Such was the interest and admiration which it excited, that the price of the first edition was raised before the second could be printed.

Stella being now in a tolerably good state of health, Swift, in March 1727, paid his last visit to London. His reception by his friends and at Leicester House was as cordial as ever. After spending the summer with Pope at Twickenham, he contemplated a voyage to France for the benefit of his health, when the death of George I. seemed to open a new way for his purpose. The king was in favour: the were roused; it was expected that Walpole's dismissal would have taken place forthwith; and the Dean, at the earnest request of his friends, especially of Mrs. Howard, who said that his going abroad at that time would look like desertion, remained in England.
Swift was suffering under a severe attack of deafness, which seems generally to have been more or less combined with his other and worse complaint, vertigo, when he received information that Stella was again in danger. He left England suddenly, almost capriciously as it appeared to his friends, who had but an indistinct notion of his connection with Stella, and in October, 1727, landed in Dublin to find his companion on the brink of the grave. She died Jan. 26, 1727.

When Swift had somewhat recovered from this last and severest shock, he found Walpole still in power, and high in favour with the queen as well as the king. He now kept no terms with the court; he attacked Walpole especially, and the queen, who in former times had been a constant admirer of the queen.

At the same time he applied himself vigorously to the affairs of Ireland: he published several tracts for the amelioration of the unhappy state of that country; and, with the same object in view, commenced a periodical publication, in conjunction with Dr. Sheridan, called 'The Intelligencer,' which however was soon dropped. In 1728-9 the Dean spent about a year with Sir Arthur Acheson, at his seat of Gosford, in the north of Ireland; here he wrote several songs and a poetry, which were intended for the amusement of the family and guests; among these was 'The Grand Question debated, whether Hamilton's Dawn should be turned into a Malthouse or a Barracks,' affording evidence that age had not in the least impaired the vigour of his imagination. He sat with Mrs. Vane, the sister of the late Lord Bute, and played in the family of Lord Berkeley. In 1730 the Dean was a guest for six months in the house of Mr. Leslie at Market Hill, a small town at a short distance from Sir Arthur Acheson's. Near this town he intended to build a beautiful house and a noble estate, but his death prevented him from carrying his plans into effect.

In a satire upon the Dissenters, in 1733, the Dean had paid a few lines against the poor Betty Basset, who was a servant-and-waiter to a member of the Irish parliament, and who, on reading the lines was so highly incensed that he drew a knife, and swore he would cut off the Dean's ears; he proceeded direct to the deanery with that intention, but as Swift was on a visit at Mr. Worrell's, Bettesworth went there, and requested to speak with the Dean alone, whom he addressed with great pomposity, 'Dr. Jonathan Swift, Dean of St. Patrick's, I am Serjeant Bettesworth.'

'Of what regiment?' asked Swift. An altercation ensued, which so excited the poet and the member of parliament, that they ran into the room and turned Bassetworth into the street. To guard against any similar attack in future, the Dean's neighbours formed an association, for the purpose of watching the deanery and guarding the person of the Dean from violence.

In the year 1735 he supported the clergy in their claim of the title of pasturage, or agistment, in opposition to the Irish House of Commons, and gave vent to his indignation against the laws, which he considered as most inimical and pointed of his satires, 'The Legion Club.' The poem was hardly finished when he had one of the most intense and long-continued attacks of vertigo which he had ever suffered, and from which indeed he never thoroughly recovered.

In 1736 Swift opposed the primate Boulter's scheme for regulating the exchange with Ireland by diminishing the value of the gold coin in order to increase the quantity of silver; he spoke against it in public; he wrote ballads against it; and an proclamation was printed in the public papers for carrying the measure into effect was read, the bells of the cathedral rang a muffled peal, and a black flag was seen to wave on the steeple.

Swift's public life may now be said to have closed. From 1736 to 1738 he had been actively, strenuously, and often dangerously busied in guiding by his pen the course of public affairs; but during the latter part of this period his infirmities and sufferings rapidly increased. In 1738 Bolingbroke had attempted to get the English court to change the exchange of his deanery for the living of Burfield in Berkshire, worth about 400£, but it was too late; the sacrifice of dignity and income was greater than, at that period of his life, he was willing to submit to. He still continued to correspond with foreign statesmen; and was employed at the same time by Mrs. Drury, Lady Betty Germain, by all of whom he was constantly pressed to come over to England; but as his attacks of deafness and giddiness became more frequent, more violent, and continued longer, he did not think prudent to venture. Gay died in 1732, and Arbuthnot in 1734, and Bolingbroke went to France. With pope he kept up an affectionate correspondence as long as he retained the power of expressing his thoughts upon paper. For several years before his mind gave way, he was hardly ever free from suffering, and never from the fear of it; and it was his custom to pray every morning that he might not live another day, and often even at night with those friends who were dearest to him, after some hours spent in the deanery, he would say with a sigh, 'I hope I shall never see you again.'

In the intervals of his fits of giddiness, his powers of judgment remained unimpaired; the latter part of his life was spent at Uxbridge. On the 26th of July, 1740, in a short note to Mrs. Whis-}

way, he says—'I have been very miserable all night, and to-day extremely deaf and full of pain. I cannot express the mortification I am under of both my mind and body. All I can say is, that I am not in torture, but I daily and hourly expect it. Pray let me know how your health is, and your family. I hardly understand one word I write. I am sure my days will be very few; few and miserable they must be, for those few days are yours entirely, J. Swift. If I do not blunder, it is Saturday.'

In 1741 Swift's memory had almost failed, his understanding was much impaired, and he became subject to violent fits of passion, which soon terminated in furious outbursts of abuse, or puerile^ abusiveness. On the 26th of July, 1740, in a short note to Mrs. Whis- way, he says—'I have been very miserable all night, and to-day extremely deaf and full of pain. I cannot express the mortification I am under of both mind and body. All I can say is, that I am not in torture, but I daily and hourly expect it. Pray let me know how your health is, and your family. I hardly understand one word I write. I am sure my days will be very few; few and miserable they must be, for those few days are yours entirely, J. Swift. If I do not blunder, it is Saturday.'

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of manner, which however were not constant and habitual, but generally arose from the indulgence of some occasional whim. From the time of his admission into Trinity College he had mixed much in society, generally of the best kind; he was an observer of society of a lower kind, but he never willingly mixed with it. He spoke in public with force and fluency.

The distinguishing feature of his character was pride—a complete consciousness and appreciation of the value of the power which he had acquired by a severe course of study and observation, combined as it was with a determination of purpose which no danger could intimidate, and which turned aside from no labour necessary to the accomplishment of his aims. He was thoroughly honest, but his honesty was often confounded with his desire for the forward progress of his species, sometimes to fastidiousness and vanity. In spite of the sternness of his character, which was often indeed more in appearance than reality, he was a man of deep feeling, devotedly attached to his friends, and active in promoting their interests; nor were his friends less attached to him.

There was much appearance of paradox in Swift's character, which often arose from his assuming, in speaking and writing, a character which did not belong to him. He hated hypocrisy, but he was hypocritical in his usages; he was led into the opposite extreme. Thus the levity of manner with which he censured the corruptions of Christianity induced many to suppose that he was not a Christian; and the tone of mirth which pervades many of his writings was in great part assumed by him with evident wickedness, as a part of the income in well-directed charity; who, of the first 3000l. which he had to spare, formed a loan-fund for the use, without interest, of poor tradesmen and others; who was a warm and steady friend, a liberal patron, and a kind man. He was a friend to his country. If it were to him, was the firm, fearless, and constant asserter of his rights and protector of her liberties. Johnson speaks of his love of a satirising. Habits of strict economy have given many a man a false character of love, who thinks nothing of giving away pounds. We have spoken of the use which he made of his money: in the obtaining of it he was no less free from sordidness. Of the numerous works which he published, most of which were extremely popular, it is doubtful if he ever received for any one a single shilling of direct remuneration. Pope obtained something for Swift's share of the 'Miscellanies,' but there is reason to suspect that he directed his friend, who did love a satirising, to keep the sum for his trouble.

Swift, the historian, the philosopher, and the man of letters, is that part of his character of which least can be said by way of justification. We have given the details of that conduct briefly, and leave the reader to draw his own conclusions.

In his political principles he outweighed all Whigs: Whig as a Tory, but past, and distinction which prevents the inter-course of individuals, he regarded with dislike and scorn. He approved of triennial parliaments, any annual parliaments; he was the defender of popular rights, and frequently exposed the danger of democracy in its different forms. He was a steady advocate of constitutional freedom. His hatred of tyranny was almost a passion. The oppression which he saw practised in Ireland was one chief cause of his dislike to living in that country. He was vexed to see the tame submission with which the Irish yielded to the tyranny of their rulers. He always spoke of his residence in Ireland as an exile, and, with intense bitterness of feeling, of himself as one condemned to die there 'like a poisoned rat in a hole.'

The separation from his friends in England certainly contributed to his feelings.

In his religious principles he was a violent high-church bigot. He would admit of no toleration either of Roman Catholics or of Dissenters as a body, and Jews he classed with infidels. But he did not extend this intolerant principle to individuals. He lived (or, it is said he did not live) on a man who was a Dissenter, and a half-brother of his, by his wife. He never broke with his father-in-law, and he did not know that he ever broke with an infidel, but he did know that Pope was a Roman Catholic.

Swift's acquaintance with the Greek and Latin writers was confined to the real advantages which he derived from the study of them; from extensive reading as a general task. He was well read in Chaucer and Milton, but never mentions Shakespeare, and does not appear to have had a copy of his works. His acquaintance with English prose writers was chiefly among the historians, especially Clarendon; but he was almost beyond any other writer, is distinguished for originality. He was an observer for himself, and was disdainful of obligation for anything but such facts as were not within his reach. His modes of combining and comparing these facts, whether ludicrous or serious, were always his own.

As a prose writer, his style is distinguished by plainness, simplicity, and perspicuity; it is sometimes ungrammatical and often heavy, but is occasionally forcible and pointed. As to his numerous political tracts, when they had accomplished the end for which they were written, he cared no more about them; and most readers now care as little. He could have written better; but he had no time to be a scholar or the slave of an author. His object in writing was to produce an effect upon the public, or to please his friends. The object once attained, he thought no more about the means by which it had been accomplished. His letters, of which a great number have been published, are excellent specimens of that species of composition: written, without any view to publication, either to keep up the intercourse of friendship or for purposes of business, they abound in practical good sense, clear, unaffected, unembellished, with occasional touches of wit and humour, such as appear to have arisen, without being sought for, in the writer's mind at the moment of writing. A few of his Sermons have been published; they are of the most plain and practical character.

As a poet, his works are also not to be considered as fair in that species of warfare. He was not one of those who make false statements; he was no assailing of virtuous character. The vices and the faults of those public men to whom he was opposed were censured with unsparing and unrelenting severity, which would have outraged the sense which are Wharton and Wood and Bettsworth. Men of less objectionable character were touched more lightly.

Swift's permanent reputation as a prose writer is likely to depend, for the most part, on the admirable extant satires on the manners and usages of the court of George I. The Voyage to Brobdingnag is a more extended satire on the politics of Europe generally. These two voyages are indisputably the most delightful parts of the book; and are read with the greatest delight. The first is founded on an admirable skill is an air of truth and reality thrown over the narrative. The Flying Island is a satire directed against speculative philosophy, especially mathematics. For this part of the work, it is believed, he was the model of some satirical work as an admirable imitation of the plain, dry, and minute style of the old voyagers, such as Dampier; and the character of Gulliver himself, as a representative of this class, is never for a moment lost sight of. The work consists of four voyages. The Voyage to Lilliput is a satire on the manners and usages of the court of George I.
Trinity College, Dublin, and afterwards resided at Goodrich in Herefordshire. He married a daughter of Mrs. White- way by her first husband, the Rev. T. Harrison. Deane Swift wrote an 'Essay upon the Life, Character, and Writings of Dr. Jonathan Swift;' interspersed with some occasional and miscellaneous critical Author, and upon the Observations of an anonymous Writer on these Remarks; to which is added that Sketch of Dr. Swift's Life, written by the Dr. himself, which was lately presented by the Author of this Essay to the Dubliners. The 'Vindication of our Hands, was first published 'The Works of Dr. Jonathan Swift, Dean of St. Patrick's,' collected and revised by Deane Swift, Esq. of Goodrich in Herefordshire,' London, 1763, 12mo., about 20 vols. Deane Swift contributed a portion of correspondence to Nichols's edition of Swift's Works, 19 vols. 8vo. He died at Worcester, July 12, 1783.

SWIFT, THEOPHILUS, was the son of Deane Swift, and was born at Goodrich in Herefordshire. He wrote 'The Gospel in the Temple, 4to,' 'The Temple of Folly,' in 4 vols., London, 1787; 'Posthumous Addresses to his Majesty,' 1788, 4to; 'A Letter to the King on the Conduct of Colonel Lennox,' 1799, 4to. His remarks in this letter gave offence to Colonel Lennox, who demanded satisfaction, and a duel was the consequence. He subsequently became a very celebrated hand, and in the year 1790 a man lurked at night in the streets of London, and wounded females with a sharp instrument. He escaped detection for some time, and the public called him 'The Monster.' A person of the name of Williams, an article of his composition, was found, he was caught, tried, and sentenced to six months' imprisonment. Theophilus Swift seems to have thought that this man was innocent, and exerted himself, both at the trial and afterwards, to prove his innocence. He wrote a 'Vindication of Renwick in the County of Down' (1800), and also 'A Poetical Address to his Majesty,' 1798, 4to. Swift's edition of Swift's Works contains several communications from Theophilus Swift. He inherited from his grandmother, Mrs. Whiteway, a considerable estate in the county of Limerick. He died in Ireland, in 1813.

(Scott's edition of Swift's Works; Watt's Bibliotheca, &c.)

SWIMMING. Huet, bishop of Avranche, in his 'Memoires,' vol. i., p. 50, relates the following anecdote of himself:— 'Being accustomed, like other boys, to bathe several times a week and in the unusual times of rain, it happened, when I was in Paris, in a stream without first trying its depth, and immediately sunk to the bottom; but being roused to the utmost excretion by the urgency of the danger, I struggled so hard with my hands and feet as to raise myself to the surface of the water. For a long time I was thrown this way and that, but the strength of the legs (hind-legs), gave him physical advantages which set all human competition at defiance. We can never expect to dart forward by a few strokes like the frog, but the method by which he does so is the only correct one. As for our aquatic engine, the art of swimming must be born in mind by the learner that the stroke which is to sustain and propel him must be compound, that is, the action of arms and legs simultaneously. It is observable that learners always waste their strength in wide struggles of the arms and legs alternately, in doing which they may splash, kick their heels up behind, get their mouths full of water, and go down. Learners will often continue to act in this way during a whole summer season, though they bathe twice a day and in the summer they may make no better progress for years. It is by the stroke made with the arms and legs at the same instant that the body is sustained and propelled. This stroke must not be made on the surface of the water, nor must the individual kick his heels in the water, or his legs become accustomed. The spurn of the legs must always be made under the water, and rather deeply so with the legs. It is advisable not to swim too straight and horizontal upon the water, as it will often occasion pain in the back of the neck. The back should be kept hollow, slanting, and steady, never rising with the stroke, except as the whole body rises. The hands must on all occasions be kept in the shape of a cup or scoop, the fingers and thumb so close that the hands would hold water, as when people drink from a brook. The same closeness and looseness should be preserved in the toes and shape of the feet, the toes being bent downwards or crooked. In making the stroke the palms of the hands are placed together and pushed straight forwards, like the keel of a boat, and its force, which is applied at the same moment the knees are drawn up beneath the body, and widely. This is the first preparatory motion for making the stroke; it is in fact crouching, or rather a sort of squatting, to take your spring. The next motion is that of the knees, which, with a small spring, get forwards, and sweeping back the water from you, with a wide, long, like that of an oar, bringing the whole of the arm manfully into action from the shoulder; but at the same moment the knees are brought back, and the feet vigorously pushing back the water beneath you, your entire effort of mind and body being that of making a spring forward. The hands are to be swept out as far as you can, and the effort to be relaxed only when both hands have been swept as far beyond a horizontal extension as you can effect without straining your shoulders and blade-bone.'
This motion of the arm and hands having been made, the action is instantly relaxed, the arms are bent, with the elbows drawn back till the ball of the thumb of each hand gently touches the ribs on both sides; and the hands being thus again brought palm to palm together, are sent forward in a direct line (the tips of the two thumbs passing exactly under the centre of the chin) to repeat the stroke. In like manner, the motion of the legs and feet having been made, the knees are extended out straight, with the toes pointing gently downwards, till the knees are again drawn up, to repeat the stroke. The learner should understand that the principal propelling power is in the legs; the arms are only used to steady the body. Thus, while ensuring a straight line of motion upwards for the head above the surface. The power of propelling, as well as sustaining, by the action of the arms and hands, he will discover as he acquires proficiency. But as it is important to acquire the best method at the start, so as to ensure the foundation of a good habit, he should make the sweep of the arms and hands describe as wide a semicircle as he can, while the extent of water acted upon by the legs is of still greater importance. At the moment when the hands pressed together are passing under the centre of the chin, the knees should be drawn up, by no means close under you, but as widely as you can, and with the heels as far apart as you can extend them without straining yourself, the toes being contracted (so as to render the sole concave) and pointing outwards. The width of this sweep is important, and one of the chief distinctions between a fine swimmer and others, because it is the object of the former to get as large a wedge of water between his legs as possible, so that when he plunges back the water is not driven back beyond the soles of his feet. You may at the same time bring the whole inside surface of his legs to bear upon this wedge in the act of bringing his heels together. The propelling power of the soles of the feet is a trifle in comparison with that which is to be obtained by the creation of this wedge, the greatest amount of force is to be obtained from the inside and under part of the thighs; and this is one reason why thin men are not so well adapted to become fine swimmers as those whose limbs present a larger surface to act upon the water.

Confidential use of corks, bladders, or life-preservers is certain to retard, if it does not completely destroy, the learner's confidence in the natural buoyancy of his body in the water. They are also bad supporters for those who wish to learn the real consequence of any particular action of a limb or motion of a part of the body in the water, because they cause you to bob about; and not only prevent you from doing what you intended, but often make you do the contrary. They teach you not to rely upon yourself, and should be regarded as drawbacks to the art of swimming. It is very important to be able to swim without their assistance, and to use them only as an emergency, and in cases where their use is absolutely necessary. When you have gained a command over the element: a considerable degree of confidence however may be acquired from repeating a very simple experiment. Choose a spot for swimming where the bank is gently sloped, and wade in till the water reaches your breast-high. There is of no use wading in too far, and becoming bewildered in your attempts, however you may, without assistance, turn round and face the shore or bank, and as the learner will thus be aware that his efforts are tending in a safe direction, he may plunge forwards and downwards without fear of losing his footing. Thus extending the arms and bringing up some gravel, or a stone if the water be clear enough to see one. So far from sinking to the bottom in anything like a horizontal position of body being an easy matter, the learner will immediately discover that it is very difficult to get to the bottom with his hands, and bring up the gravel or stone. Another method of ascertaining the natural buoyancy of the body, and how little it really requires to sustain it on the surface of the water, is to take a couple of common boat-boats, place one under the back of the neck horizontally, and lifting up first one heel, then the other, place them across the other oar, extending the body stiffly at the same time, if you be acquainted with a good sink gently backwards upon the water, with his chest elevated and his legs extended straight, and he will find how very little he needs to support him. It is always to be borne in mind, however, that nobody can readily learn to swim who has already a good habit of being immersed, an occurrence quite unavoidable at first, and which must be considered as of no sort of consequence. The only real objection to it (for a few mouthfuls of water now and then can hurt no one who is in good heart) is when it occasions the headache, as it does to receive a painful degree with some individuals when they have attained the age of manhood. For this reason, among many others, swimming should be learned in early youth.

We must impress upon the learner that he should enter any piece of water which is everywhere out of his reach, or contains unknown holes which are so; indeed it would be best not even to bathe where there is a shelving bank leading to water beyond the learner's depth, without a firm platform of some kind by which he can rest his face and hold his breath till he can thus sink gently backwards upon the water, with his chest elevated and his legs extended straight, and he will find how very little he needs to support him. If they have accidentally got into deeper water, so as to be unable to do this, they instantly feel themselves in danger of being drowned, and splash and scramble back again in a confused manner. The best deep breath-breast; but the water should not rise above the chest, or lie will be unable to walk, or, perhaps, keep his feet. Should he, after making a few efforts to swim, accidentally get into a deeper, or else raise himself on his chin, he must not hastily attempt to walk backwards; for sooner would he lie one leg over the water would take the other from under him, which might confuse him: he must either plunge forwards boldly towards the less deep part of the water, or, if the learner does not consider this right, he can but take a few steps out in slow and sliding steps, carefully keeping his arms and hands under the water to steady himself. No learner should enter the water without a companion who can swim well, or at all events is taller and stronger than himself.

General Pfuel's Method.—The method of teaching swimming, which was first introduced in the swimming-schools of Prussia, by General Pfuel, is, in all respects, excellent, and may be briefly described. The teacher stands on a platform on the edge of the water (the level borders of a river would be just as good) behind a strong oak rail, running horizontally to the extent of twenty or thirty feet, and about four feet high from the level of the platform or walk. The platform, which is about twenty feet in length, to the top of which a rope is attached, which descends towards the water and is inserted in the ring of a belt, which is fixed about the waist of the learner, who lies along the water. The wooden rail thus becomes the means of prolonging the hand. This is the knot of the tree hand one hand of the teacher, as the staff rests upon the rail, and also has the other end upon the ground. The learner is supported by the rope, which rises from the ring between his shoulders. He lies straight along the water, the arms stretched out along the sides, the hands and each with and the legs stretched out, with the heels touching each other, and the feet turned outwards, though the toes are crooked in. The teacher begins with the action of the Heel, "One," and the pupil draws up his legs, keeping the knees as far apart as possible. The word "Two" is then given, and the pupil makes the stroke with both legs, striking out his legs so that the heels shall describe as large an angle as possible. At the word
"Three!" he resumes his original position. When he can effect the motion properly in three divisions, he has to perform the same in two; but if he fail to extend his legs wide enough, or to do the last two motion separately (as two and three), until he can give the wide stroke efficiently before returning to the first position. While the motion of the legs is being practised, the pupil must keep his arms extended forward in the water, and most of his weight must be put on the hands. This is done in two divisions. The teacher says 'One!' and the pupil's hands, which were extended with the palms placed together, are separated, and laid about two inches under water, with the palms downwards, and the arms are extended under the body. If the pupil is able to rest himself by quiet floating, he can swim ten strokes in succession, the pupil's hands are brought under the chin. 'Two!' is the signal for stretching the hands forward to regain the first position. It is important to make the motions slowly at first, in order to secure the utmost width of stroke. When the motions of the hands and legs are properly performed, they are then united, and at the word 'One!' the first motion of the hands and legs is performed; at the word 'Two!' the second and third motions of the legs, and the second of the arms, are made. When the learner begins to be able to support himself, the teacher raises the lower part of his staff (resting against the rail), which thus lowers the top, and therefore slackens the top. When you raise your hands in front of you, you are in an intermediate position if you see the pupil sinking. When he can swim ten strokes in succession, the5 staff is abandoned, and the master only holds the rope; when he can swim forty or fifty, he is in a position to be able to rest himself by quiet floating.

The pupil is not considered safe until he is able to swim for half an hour without resting or receiving assistance.

**Turning in the Water.**—The learner should regard his hands as two fins, and his feet as a double rudder, (or, if his heels are close and his feet turned out) as a fish's tail. To give minute directions for the various positions of the hands would perhaps only confuse; it will be better to content the remarks to a few general principles, and to make the pupil understand the application of which he can only ascertain by practice in the water. He who can swim forwards, and would turn to the right or to the left, has merely to turn his head in the direction he would go, and narrow the sweep of the arm on that side to which he would turn, or back water with the hand on that side if he would turn rapidly. Nature will second his efforts far more efficiently than he expects. In like manner, if he would turn back, he has only to turn the palm of one hand upwards, and to place the hand Thus, if he would sweep towards the right, the hand of his left arm sweeps inwards, as if embracing the water or taking an armful of it towards his side, and round he goes in two or three motions. The legs will act as they ought. They will be used with much more facility, and will be more rapidly effectuated if the legs be dropped, and the feet strike downwards: in short, if the position of the body be nearly perpendicular, as it will thus present so much less surface for resistance.

**To Swim on the Back.**—Sink backwards very softly on the water, inflating and elevating the chest at the same time, keeping the back hollow, and the head thrown back so that the eyes look up at the sky. The arms and hands should work under the water, the lower part of the legs may be drawn up and struck down in the water, both legs and both arms acting together. The action of the arms is not necessary for swimming on the back, except in learning, and they should be rested with the hands placed upon the thighs. If they pass from the position called the rest. The arms play a more important part in swimming on the back. The causes of difficulty in acquiring this mode of swimming may, in nearly all cases, be reduced to two: the dropping of one leg towards the bottom in order to avoid the immediate touch of the knee to the ground; and the bending of the body instead of keeping it quite straight, which bending is usually accompanied by raising the head with intent to look at the legs, in any of which processes the learner is certain to sink immediately.

**To Float.**—Having learned to swim on the back, it will not be difficult to acquire the art of floating. The chief principle is that of taking the right position. The learner should lie backwards very softly and very straight, the back hollowed, the chest elevated and inflated, and the head thrown well back till the water encircles the face. It is always to be recollected, the water as deep as it may be, so long as the nose, ears, and eyes are not immersed, the human body safely floats. The legs must remain perfectly straight and quiet; the palms of the hands should be turned downwards and gently beat down the water like fans. If the body begin to roll over on one side, the palm of the hand, which causes the turn, must be turned downwards, and one or two gentle motions will restore the equilibrium.

**Cautions.**—The learner should avoid the practice of all ingeniously antic and manoeuvres, however curious and amusing, until he can swim well in the ordinary way, both-way and backward. Some of these are accompanied with a tendency to strain the arms, and prevent the touch of the nostrils (to expel the water) before you take in your breath at the mouth. Avoid water which contains cold springs or beds of weeds. Whenever you attempt to save the life of a drowning person, you should always keep near enough to reach him with a long pole. The pupil is not considered safe until he is able to swim for half an hour without resting or receiving assistance.

**Swimming in a state of perpiration, nor when very cold, except if recently heated. If you are subject to the cramp, never bathe out of the reach of assistance. When you raise your hands in front of you, you are in an intermediate position if you see the pupil sinking. When he can swim ten strokes in succession, the staff is abandoned, and the master only holds the rope; when he can swim forty or fifty, he is in a position to be able to rest himself by quiet floating.**

He received his education at the monastic seminary of Laocelle, in France, where he made rapid progress in the study of ancient and modern literature and in drawing. By the death of his eldest brother, he became possessed of an annuity and of a small estate at Hamsterley, in the county of Durham, and was thus placed in independent circumstances. He now set out on a tour, in which he visited Turin, Genoa, Florence, Rome, and Naples, and thence to Vienna, where he obtained a position in the knowledge of works of art and in drawing. On his way home through Paris, he became acquainted with and married Miss Basset, daughter of the then solicitor-general of the West Indies, and, returning to England, remained there about a year, and then went to Naples, where he amused himself with gardening and laying out grounds. He then recommenced travelling, and resided in Paris in March, 1774; and the autumn of the same year he proceeded to Bordeaux, and, after spending a year in the south of France, accompanied his friend Sir Thomas Gascoigne on a tour in Spain; they travelled along the coast from Barcelona to Cadiz, and thence through the interior to Madrid, Burgos, and Bayonne, where they arrived in June, 1776.

About that time he published an account of his Spanish tour in a series of letters, and spent the latter part of the year 1779 in England. The next year he travelled through France and Italy to Vienna, where he was received with much kindness. He was the son of the late Mr. William and Mrs. Antoinette, who obtained in compensation a grant of land in the island of St. Vincent, the value of which was however much reduced on the cession of this island to Great Britain. In 1786 Swinburne again went to Paris, and returned in 1789.
After having long solicited a diplomatic appointment from the British government, he was appointed, in 1796, commissioner for the adjustment of the cartel then proposed for the exchange of prisoners-of-war between France and England. In the performance of this service great difficulties occurred. The first was the refusal of the Swiss government to give up Sir Sidney Smith; and, after long and fruitless negotiations, Swinburne was finally recalled at the close of the year 1797. His latter years were saddened by the loss of his son, who was shipwrecked on his way to Jamaica, and by the decrepitude of his old age, which induced him, in 1801, to accept the offices of vendue master in the island of Trinidad, and commissioner for the restoration of the Danish islands. After a few months' residence at Trinidad, Swinburne fell a victim to the climate, April 1, 1802.

For his services the emperor of Austria voted him the title of the 'Courts of Europe at the close of the Last Century,' 2 vols. 8vo., London, 1841. This publication contains many curious details concerning the courts of Louis XV. and Louis XVI., and the most stirring periods of the French Revolution. Swinburne is a lively and sensibly writer; he describes everything in an easy, unaffected, and sometimes forcible style; he is an attentive observer of national characteristics, and has selected with judgment such anecdotes and incidents as best illustrate the manners of his countrymen.

For his Life see a short notice in Nicholl's Literary Anecdotes, vol. ix.; the Introduction to his Courts of Europe; and his Letters generally.

SWINDON. [WILTSHIRE.]

SWINEMUNDE is a small but important town in the government of Stettin, in the kingdom of Prussia, in 53° 30' N. lat. and 14° 12' E. long. It is situated in the island of Usedom, at the mouth of the river Swine, which here falls into the sea. All ships, whether Swinemunde, and, till of late years, the entrance was obstructed by a bar, so that ships drawing more than seven feet water could not pass it; and large vessels were obliged to discharge part of their cargoes into lighters before they could proceed to Stettin; and those which were going to sea had to complete their cargoes after crossing the bar. To remedy this inconvenience, which was more and more felt as the trade of Stettin increased, it was resolved to construct two great mole, and thereby deepen the entrance. This was commenced in 1839, and happily completed in six years, so that now, as Hirschmann states, the largest merchantmen can proceed direct to Stettin without unloading any part of their cargoes. Nearly 1000 ships pass the river. Swine, a pleasant town, with nearly 4000 inhabitants, who are for the most part fishermen, pilots, and sailors. The pilots form a distinct guild under a commander: they have a watchtower on the coast, and are bound to look out for and announce the arrival of ships, as well as to guide them into, or to remove them from, the harbour. The town has a considerable trade, and many merchandises are built here. It has become of late years a much frequented watering-place. (Müller's Worterbuch; Cannabach's Handbook.)

SWINDON. [STAFFORDSHIRE.]

SWITZERLAND (called in German, Die Schweiz; in French, La Suisse; and in Italian, La Svizzera), is situated between 45° 48' and 47° 49' N. lat., and between 5° 51' and 10° 36' E. long. France extends along the northern and western borders of the country. Germany extends on the north, the Rhine and Geneva on the Rhône. The boundary-line is partly formed by one of the ridges of the Jura Mountains, and partly by the course of the river Doubs, an affluent of the Rhône. At two places it is quite conventional. On the south of Switzerland, at the continental possessions of the king of Sardinia and Austrian Lombardy. The boundary-line between Switzerland and the Sardinian states is marked by strong natural features, except at the western extremity, where the territories of the canton of Geneva are surrounded by Savoy. Farther east it runs along the south of Lake of Geneva, and towards its eastern recess, where a high range of the Alps terminates on the banks of the lake near St. Gingolph, the boundary-line runs southward along this high range, until it meets the northern extremity of the mountain-mass of Mont Blanc. From Mont Blanc it turns eastward and extends along the higher part of the Pennine Alps to Mount Rosa, where it tends to the northeast along the Leopontian Alps to the great mountain-knot which surrounds the St. Gothard Pass. From this mountain-knot it runs first southward and then south-west along the ranges of the cantons of Uri and Nidwalden, and after wards south-west over mountains and valleys to the lake of Maggiore. East of that lake the territories of Austria begin. The boundary here runs first southward to the south-west over the lake of Locarno, the north-western portion of which belongs to Switzerland while the south-western and north-eastern extremities belong to Austria. A tract of country which extends several miles south of the southern banks of the lake of Locarno is included in the state of Switzerland. On the south-west the boundary meets the frozen roads, which are nearly due north, and separating the valleys of Missoco and Giaccomo, forms the boundary: Missoco, to the west, belongs to Switzerland, and Giaccomo, to the east, to Austria. This mountain-range joins the principal boundary near Rhé-de-l'Alpe, on the mountain-pass of Splügen. Along the last-mentioned chain the boundary extends only for a few miles; it then runs east of south along a lateral range, crosses the river Rhine, then, by the valley of the river Rhistan, which is nearly due north, and, separating the valleys of Missoco and Giaccomo, forms the boundary: Missoco, to the west, belongs to Switzerland, and Giaccomo, to the east, to Austria. The boundary crosses the Rhine at Lake Constance; the Rhine up to the lake belongs to Austria, and the valley of the Rhine in the south-west to the lake, to the north belongs to Switzerland, and to the south to Austria. The Lake of Constance constitutes the boundary between Austria and Switzerland. The boundary-line runs along this chain south-west until it meets that lateral chain which is called by the name of Rhéaticum, and which borders the Rhine between the Prättigau on the south-west, and the Montafoner valley on the south-east. The first belongs to Switzerland, and the second to Austria. The boundary runs along an elevated chain of the Rhéaticum range, and after running northward along an elevated chain of the Bernina range, and after crossing the river Inn, reaches the central chain of the Rhéaticum Alps, which it follows through the ranges of the Alps, the Rhéaticum, and the Valais. From the south-west to the lake, the Rhine, and the river Inn, the Rhine up to the Rhéaticum range, the Rhéaticum line, and the Rhéaticum range, constitutes the boundary between Austria and Switzerland. The boundary between Austria and Switzerland is about 1,000 miles long, 1,500 miles east to west, and about 200 miles north to south. The area of Switzerland is about 16,500 square miles: it exceeds half the area of Scotland, including the islands, by 1,000 square miles, and is nearly equal to twice the area of Wales. The surface of Switzerland presents a greater variety than most countries of Europe. The greater part of its mountains, Mount Rosa, attains an elevation of 15,154 feet above the sea-level, while the surface of the Rhine at Basel is only 600 feet, and that of the Lake Maggiore, on the southern boundary, 1,300 feet above the sea. The greater part of the country is mountainous, the ranges of the Alps and their numerous offsets extend over the southern and south-eastern districts, and occupy about three-fifths of the country. Along its western boundary runs the ridge of the Jura Mountains, and the country between these two mountain-systems has, towards the south, the face of a plain, interspersed with isolated hills; and towards the north it is traversed by ridges or groups of hills of moderate elevation. Switzerland is naturally divided into four regions: the Alps, the Plain, the Hilly Country, and the Jur Mountains.

The region of the Alps, which is the most extensive, is divided from the plain and Hilly Country by a line which begins on the Rhine at Basel is only 600 feet, and that of the Lake Maggiore, on the southern boundary, 1,300 feet above the sea. The greater part of the country is mountainous, the ranges of the Alps and their numerous offsets extend over the southern and south-eastern districts, and occupy about three-fifths of the country. Along its western boundary runs the ridge of the Jura Mountains, and the country between these two mountain-systems has, towards the south, the face of a plain, interspersed with isolated hills; and towards the north it is traversed by ridges or groups of hills of moderate elevation. Switzerland is naturally divided into four regions: the Alps, the Plain, the Hilly Country, and the Jur Mountains.
extremity of the lake of Thun. From the northern shores of the lake of Thun it runs again north by east to Mount Nafpl, which it has been described in the present chapter, and of the banks of the Rhine. [Rhine, vol. xix., p. 459.] The whole country south of this line is occupied by the moun-
tain-masses and chains of the Alps, and only a small portion of it is cultivable; a larger portion, which is on the upper inclinations of the mountains, is available as pasture-
ground.

The natural division of the Alps of Switzerland is formed by the immense mountain-knot which is on the west of the mountain-pass of the Saint Gothard, and surrounds the sources of the Rhine, which rises there. The western side of the mountain-knot is made up of the whole of the cantons of Bern and Luzern, near 47° N. lat. and 8° E. long. From Mount Napf it runs due east to the northern extremity of the lake of Luzern, and thence east by north, crossing the lake of Zug to Mount Hoch Eiger, which is near the most southern part of the lake of Luzern. From this point it follows the depression which runs east by south from the lake of Zürich through the valley of the Limmat, the lake of Wallenstadt, and the low ground which extends from the eastern side of the lake of Zürich to the banks of the Rhine.

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the river, that in several places there is hardly room enough for a road along the banks of the stream. About eight miles from its influx into the Lake of Geneva, the low tract along the banks of the river becomes two miles wide. It is a swampy tract, very little elevated above the level of the lake, which is about 1210 feet above the sea-level. The descent of the river from the Jura to 220 feet, but this drop will not account for the great diversity of climate between the higher and lower parts of it. Above Briegg the corn remains in the fields till the beginning of October, and it is reaped west of Sturt on June 1st. The climate of the high land is cold, even in summer; whilst in the lower, at the same season, the thermometer frequently rises to 88° and 98°. This great difference can only be accounted for by the circumstance, that immense glaciers approach very near the inhabited districts of the higher districts from the south, whilst the lower portion of the valley is at a considerable distance from the ice-covered mountains, and immediately surrounded by high and nearly perpendicular rocks, which reflect the rays of the sun. Only the common grains and roots of northern Europe are cultivated above Briegg, and some fruit-trees do not grow: the lower districts produce maize; and the vine, almond, and fig-tree flourish.

On the northern side of the valley of the Rhône are the most elevated districts of the Jura, which is parallel to the course of the river. Their eastern extremity is formed by a ridge called the Grimsel, over which a mule-road leads from the valley of Hasli to that of the Rhône. The highest part of this road is 8300 feet above the level of the sea. To the north of this pass the valley of Hasli begins to descend in the largest continuous mass of ice and snow on the Alps. It extends on both sides of the highest edge of the range, and occupies, from east to west, from the valley of Hasli to that of the Aar, 100 miles long in a straight line, and from north to south a space of about three, or possibly nearly the whole of the country between the lakes of Brienz and Thun and the valley of the Rhône. Its area is about 600 square miles. The outer edges of this region only are inhabited. A chains of Montagnes, almost uninhabited. The north of them, the valley of Lötsch, opens towards the south into the valley of the Rhône, and two open towards the north, into that of the Aar. The two last-mentioned are the valleys of Grindelwald and Lauterbrunnen, which are annually visited by many foreigners, as they offer the most easy access to the glaciers. From this immense lake of ice rise numerous summits, chiefly in the form of pyramids: along the highest portion of the region, from east to west, are the Finsteraarhorn (15,107 feet), the Mönch, or Monk (13,550 feet), the Jungfrau, or the great snow mountain (13,462 feet), the Aletsch (12,772 feet), and the Rinderhorn (11,683 feet), the Wildstrubel (10,980 feet), and between them several others hardly inferior in elevation. To the north of these summits, among which the highest is the Eiger (12,922 feet), the Schreckhorn (12,445 feet), the Wetterhorn (12,920 feet), the Blumna Alp (12,145 feet), and the Dolderhorn (11,950 feet). The Faulhorn, not far from the lake of Brienz, rises only to 6750 feet, but it is frequently ascended by travellers on account of the magnificent view which it offers of the numerous mountains and glaciers which lie to the south of it. At the western extremity of this region a road leads from the valley of the Kander to the valley of Lötsch in Wallis. It traverses the ridge called the Geniesen, and in its highest part it was at a height of 6446 feet above the sea. It is partly cut through rocks, and only practicable for beasts of burden.

The valley of the Kander separates this region from that which lies west, and in which the Alps rise above the snow-line only in a few places. The highest part of the mountains continues to run south-west, as far as the three-headed summit, called the Diablerets, or the Teufelshörner, which is nearly due north of the great bend of the Rhône and is nearly 12,000 feet high. The passes in this chain vary between 3000 and 5000 feet in elevation, but some of the summits rise above the snow-line and attain more than 10,000 feet. The highest summits from east to west are: the Oeschelhorn (10,359 feet), the Wildhorn (10,724 feet), the Aarhorn (10,417 feet). At the Diablerets the chain divides into two branches, one of which runs south-south-west and terminates on the banks of the Rhône, opposite the Dent du Midi, in high rocks, and the other extends westward towards the eastern extremity of the Lake of Geneva, and in approaching the lake turns gradually to the north and terminates in Mount Moleon (6577 feet). In the first of these two chains is Mount Myevier (8882 feet) and the Dent des Morcles (9567 feet), and in the second Mount Oldenhorn (10,362 feet). Though these summits and a few others rise above the snow-line, they occur at considerable distances from one another, and the glaciers which surround them are comparatively small. The country which extends north of this range, between the river Kander on the east and the Saane river on the west, and terminates in the parallel of the northern extremity of the Jura, is a continuous country: but it does not appear that the summits which are always covered with snow are numerous; several of them attain an elevation of 8000 feet above the sea-level, and from 4000 to 5000 feet above their base. The form also of these mountains differ from that of the higher Alps, their summits not rising in peaks or sharp ridges, but being rounded and rather flat at the top: the declivities are generally steep, though much less so than those of the higher mountains. In many places the higher parts of the ridges and groups are above the line of vegetation, but as the lower declivities are covered with fine grass, which supplies excellent pasture during the summer months, and with trees, this region contains a much greater portion of productive land than the summits of the Alps, though the proportion which is cultivated is very small. It is, therefore, excellent pasture. The highest and most continuous ridge of mountains in this country is that which lies nearest to the preceding region, and extends to the west of the valley of the Aar, and north of the lake of Thun, to the foot of the bank of the lake of Thun, where it terminates in Mount Niesen (7213 feet) whence it is called the Niesen range, though some of the summits rise 300 or 400 feet higher. Among the isolated summits is the Stockhorn, which is west of the lake of Thun, and is 8730 feet high, and is frequently visited by travellers on account of the extensive prospect from its summit.

The valley of Hasli, at the most southern extremity of which the Aar originates in the Aar Glacier [Rhône, vol. xix. 459], is 30 miles long and extends in the form of a semicircle more than 20 miles to the influx of the Aar into the lake of Brienz. The climate is not so cold as might be supposed, because the glaciers do not approach the immediate vicinity of the valley, but are separated from it by low mountains which conceal the declivities of the snow-covered masses. Though the valley in the upper part is only between a quarter and half a mile wide, and in the lower between half a mile and a mile, it begins nearly 3 miles from it to all sides, and the declivities of the mountains which enclose these valleys, and those of the principal valley, contain rich pastures. The lower part of the valley is partly cultivated and partly meadow-ground. There are extensive plantations of walnut-trees. Along the north side of the lake of Brienz, the offsets of the Faulhorn rise with a steep face, leaving little ground for cultivation and pasture; but to the north of the lake a hilly tract, partly cultivated and partly meadow-ground, intervenes between the lake and the mountains. The low and level tract which lies between the lakes of Brienz and Thun, and is about four miles long and two miles wide, is fertile, well cultivated, and has extensive plantations of walnut-trees. The climate is so temperate that the flowers blossom in the month of February. Along the northern banks of the lake of Luzern there are many mountains which approach close to the water; but as they are not high, nor their sides precipitous, there is a considerable tract between them and the lake, which is used for the cultivation of grain and other cereals, and as pasture-ground. There is a similar tract of greater extent on the south of the lake; and towards the western extremity of the lake the mountains disappear and the plain begins.

The country which extends north-east of the river Aar and the lake of Luzern to the lake of Brienz and the lake of Thun, and eastward to the high range which runs from Mount Titlis to the strait which connects the lake of Uri with that of Luzern, is much less mountainous and broken; the highest region which is south of the lake of Thun, the lake of Brienz is 2560 feet above the sea-level, that of Thun 1875 feet, and the lake of Luzern 1343 feet; and consequently the mean elevation of this region can hardly be estimated at less than 2000 feet. The most elevated tract of mountains which lies between the Rothhorn attains 7356 feet above the sea, the Tannhorn 6092 feet, and the
Hobgant 7352 feet. These summits may be considered as the most northern range of the Alps in this direction, for the mountains north of them are generally isolated, and hardly attain an elevation which entitles them to the name of mountains in the vicinity of the high masses lying farther south. The highest of them, Mount Pilatus, west of the town of Luzern, is only 6904 feet above the sea-level; and Mount Napf, which is the north-western point of this region, is only 5277 feet. The surface of this country is a succession of ascents and descents, with very small tracts of level ground. The whole, in fact, is formed of terraces, and the routes, called steep, are too rapid to admit of the use of the plough, and hence nearly the whole of the country is pasture-ground, except that in the vicinity of the lake of Luzern large tracts are planted with walnut and other fruit-trees. Along the eastern edge of the mountain-knot, west of the pass of St. Gotthard, lies the valley of the Upper Reuss, of which a more minute description is given under Rivers, vol. xx., p. 23. The upper part of this valley, or that of Ursern, is extremely cold, being in its lowest part 4644 feet above the sea-level; the lowest part, or the valley of Uri, has a very temperate climate, being little elevated above the surface of the lake of Luzern, or about 1500 feet above the sea-level, and the high part of it is not visited until the end of August or the beginning of September. The mountains of this region are covered with snow in late autumn, and the snow-line, termed here the 'ground,' extends from 2829 to 3050 feet. The highest of these montane peaks, the Piz Murtschenstock, is only 11,068 feet, and the lowest, the Horner Morgen, is 8954 feet.

The mountain-knot in the middle of Switzerland is an almost continuous range, the mountains of which extend from the northernmost range of the Alps, the Ostalpen, which rise above the Rhine, to the Lake of Constance, on the Sea of the North, a distance of about 240 miles. It is divided into two main branches, which diverge at an angle of 15°, the western branch forming the northern boundary of Switzerland, and descending to the plain of the Rhine near Constance, and the eastern branch forming the border to the east, and descending into the plain of the Leine near Wurtemberg, where it is separated from one another by mountain chains which commonly extend to the banks of the river. The highest of these occurs near Trons, where the surface of the river is 2895 feet above the sea-level. That portion of the valley which lies on the west side of the chain constitutes the watershed between the Rhine and the Rhone, and on the east side is separated from the Rhine by the range of the Fiescherstock, known as the Fiescherhorn, which extends close up to the river north of Meyenfeld, near 47° 5' N. lat. The southern district, called the Valley of Meyenfeld, descends gradually from about 1775 to 1600 feet. It is about 15 miles long, and varies in width from 2 to 3 miles; the surface of it is tolerably deep, and produces wheat, and other grains; and near the base of the adjacent mountains there are vines and fruit-trees. The northern portion of the valley, called the Rheintal, or Vale of the Rhine, is about 30 miles long, and from 3 to 6 wide; but the smallest part of it, which extends along the western banks of the river, belongs to Switzerland; the low country east of the river, which is much wider, belongs to Austria. It is one of the best cultivated tracts in Switzerland, and contains the principal vineyards. The vine and fruit-trees are abundant. Great quantities of cider are made and exported. The descent of the valley from 1600 to 1340 feet above the sea-level.

The principal range of the Rhaetian Alps branches off to the east of the mountain-pass of St. Gotthard, south of Mount Badus, and runs eastwards. It is less known than the other ranges of the Alps, and only a few of its numerous summits have been measured. A continuous range of mountains, of which these are described, extends 20 miles to Piz (Paskl) Valrhin, which attains an elevation of 10,960 feet, and is surrounded by extensive glaciers, which are the source of the Hinter-Rhein, the largest of the upper branches of the Rhine. Not far from it is the Pass of Trons, the largest of the great mountain-passes to the north-east over the Martinstal, the Oberlenzstock (10,872 feet), the Dödi (11,811 feet), the Kistenberg (11,066 feet), the Scheide (10,000 feet), and the Graue Hörner (9335 feet), the last-named peaks near the Rhone, and on both sides of the deep and closed valley of the Temña, in precipitous masses of rock. The glaciers on this chain are numerous, but with the exception of those which surround the Dödi and Kistenberg, they are not of great extent. In the country north of this range there is also a considerable number of small mountains, which rise above the snow-line, as the Windgellen (10,336 feet), the Scheehorn (10,899 feet), the Clara-Rden Alp (10,498), the three mountains of Glärnisch, of which the most elevated, Hoch Glärnisch, rises to 9509 feet, the Kästigen (9157 feet), and several others. At these mountains are isolated, the glaciers are of small extent. The mountains are less elevated along the northern edge of this region, as the Mürtenstock, which runs along the eastern banks of the lake of Lucerne, and attains an elevation of 7750 feet above the sea-level. In proceeding north-west the mountains decrease in elevation, and their declivities are much more gentle. North-west of a line drawn from the narrow strait which unites the lake of Lucerne to the Rhone, is the high ground of Wallenstadt, there is no mountain which is covered with snow all the year round, and only a few occur whose summits are above the region of trees. But though the declivities of the mountains are generally gentle, the pasture-ground, few places are cultivated. There are lower somewhere large tracts which are planted with vines and P. C. No. 1475.
west of the valley of the Hinter-Rhein, and south of Reichenau, to 3933 feet. The valleys which lie between these ranges and mountain-masses are very numerous, but they rarely exceed four miles in width. The larger valleys are from west to east: the valley of Lugna, which opens into the valley of the Rhine at Ilanz; that of the Hinter-Rhein, which terminates near Reichenau; and that of the Lang карт, called the Prättigau, which joins the valley of the Rhein below Eyengen; and yet divers along the southern declivity of the Rhäticon. Very little grain is cultivated in these valleys, but potatoes and other vegetables are grown. Fruit-trees do not succeed, except in the lower parts. Most of them however have excellent pasture-grounds and meadows, and the level of the Artificial meadows, which are irrigated. The valley of the Hinter-Rhein is the longest: the great roads between Coir or Chur and Italy pass through it. A road leads from Chur to the village of Splügen, where it divides. The western roads pass over the Bernhaus and leads to Bellinzona, in the canton of Tessin; the highest point of this road is 6961 feet above the sea. The eastern road traverses the Splügen and leads to Chiavenna, in the valley of Bregaglia, a small tributary of the Rhine in Switzerland, and Italy. The southern slope of the Rhätian Alps, called the Bernina range, which name is derived from a mountain-pass over which a road leads from the valley of Engadine into Italy, runs parallel to the principal range from south-south-west to north-north-east; its southern part extends to 3600 feet below the boundary-line of Switzerland, with the Austrian dominions. Between the Bernina range and the principal range of the Rhätian Alps the beautiful pastoral valley of Engadin is enclosed. [Engadin.] On the southern declivity of the Bernina range, and towards south-west, are the valleys of Sondrio in the province of Sondrio, with the valley of Rhaetian Alps: the valley of Müstair, which opens into the valley of the Adige at Glurns in Tyrol; and the valley of Poschiavo, which is 15 miles long, and opens into the valley of the Adula. A small part of the province of Sondrio, near the valley of Poschiavo is a rich pastoral district, and derives considerable advantage from the road over the Bernina Pass, which runs through it. Large droves of cattle go by this road from the valley of Engadine to Italy.

Anciently this part of the southern declivities of the Rhätian Alps, between the great field of ice in which the Aar and Rhine originate, and flow southward: they all unite in the river Tessin or Ticino. The country drained by these rivers is called Italian Switzerland, because the Italian language is spoken by the inhabitants. It is traversed by several mountain-ranges, which run southward and occupy the greater part of its area. Many parts of these ranges rise above the line of trees and shrubs, but none of the summits attain the snow-line. Between the ranges there are several valleys of considerable extent: three largest are those of Misocco, Leventina, and Maggia. The largest is the valley of Leventina, of which a description is given under Rivar (vol. xx., p. 33). Each of the others is from about 22 miles in length and varies in width from 1 to 2 miles. All these valleys are very fertile. In their upper parts, which are about 3000 feet above the sea-level, very little grain is cultivated, and the inhabitants live on the produce of their herds. In the middle parts of the valleys, there are good kinds of grain, and the fruit-trees abound, especially the chestnut and pear. The lower parts, whose climate approaches that of Italy, have considerable plantations of fig-trees and mulberry-trees. A considerable quantity of silk is annually cultivated in these valleys, and the manufacture of the young silkworm is carried on in the manufacturing districts: no other part of Switzerland contains such extensive forests and such fine trees. The great road which traverses the mountain-pass of St. Gottard runs through the valley of the Adula, which crosses the St. Bernardon through the valley of Misocco. As the southern declivity of the Alps is very steep, these valleys are subject to very extensive and destructive inundations during heavy rains.

There is a considerable difference of climate between the southern and northern declivities of the Alps. On the declivity, which descends rapidly towards Italy, the snow-line occurs at the elevation of about 3000 feet; on the northern side it does not rise above 8000 feet above the sea. Rice and barley succeed on the northern declivity only in a few places in situations more than 3000 feet high: on the southern slope they are cultivated to 4000 and even 4500 feet. Both on the northern and southern slope potatoes and turnips, and cabbages are grown to the height of 2000 feet on the north. Fruit-trees are not planted in the northern side to 4500 feet, but on the south side to 6000 feet.

Agriculture is not limited to the level tracts on the banks of the rivers in the larger valleys, but it extends over the lower parts of the declivities. The whole declivity of the mountains is cultivated, with the single exceptions of the southern declivity of the Alps, which rises from 3000 to 4000 feet above the sea, and the northern declivity, which attains 4500 to 6000 feet.

The slope of the southern declivity rises to the wooded region, which, being very steep, is not adapted for cultivation. It occupies in height half the elevation of the mountains, but only one-third of its base in width. On an average, the slopes are covered with low bushes, dwarf vines, and small forests. At the back of the lower region rises the alp or pasture region, which occupies in height one-eighth of the declivity, and in width about one-sixth. The slope is much more rapid than that of the lower region, and its surface presents considerable inequalities. There are few trees on it, but some places are covered with low bushes, dwarf vines, and small forests. It bears a rich turf and many plants, among which the Alpine rose (Rhododendron ferrugineum) is admired for the beauty of its flower. For three or four months in summer cattle pasture on this region, which is divided into regular portions, properly called pastures. There are some brooks and small ponds, but in general water is not abundant, and it disappears during the dry weather in summer, and herdsmen are obliged to take the cattle lower down to the pastures. No part of this region is permanently inhabited, but there are many huts, or woz's, in which the herdsman pass the summer, while the cattle are on these pastures. In winter this region is covered with a thick layer of snow. Though the grass is very nourishing, when it is fresh cut, it is then too coarse for the stock, and a space is required to feed an animal on less than the elevation between the lake of Thun and that of Luzern.

The rocky region, which comprises the crest of the mountain, is almost destitute of vegetation. This region occupies about one-fourth of the base of the declivity, and one-sixth of its width. It is however of smaller dimensions, and sometimes it does not exist at all on mountains whose summits do not attain the highest line of vegetation. In such a case the crest of the mountain resembles the alp or pasture region.

The valleys which are above the size of ravines have a peculiar form. The smaller valleys consist of one basin,
The river Rhine has a very large distribution; it opens by a very narrow gorge, frequently more than a mile in width, through which the rivulet which drains the basin runs, and which in most places is hardly wide enough to convey the water to the wider valley. The surface of the basin is sometimes a dead level; but its depression is generally in the upper course of the basin, and the lowest part of the basin is under water, when rain or the melting of the snow increases the volume of water in the rivulet so that it cannot be carried off by the narrow gorge by which it issues from the basin. At some places it has been found necessary to make embankments along the rivulets to prevent the fields from inundations. The larger valleys consist of three to five of such basins, which rise like terraces one above the other towards the source of the river. Thus the Rhine runs first for about six miles in a ravine, and then enters a basin, which is from one mile to two miles wide and about 24 miles long, and called the valley of the Rhinwald. The hamlet of Hinter-Rhein, which is near the place where the basin begins, is 5000 feet above the sea-level; this narrow tracts of the river, in its lowest extremity, is only a little more than 3000 feet. About two miles below this village the valley is shut up by mountains, and between them the river runs for about three or four miles through a very narrow gorge, called the Rofflen, in which it has the severe descent of 1000 feet; in this part, or at least in the lower part of the basin, there being not space enough for it along the banks of the river. Below the Rofflen is the second basin, called the valley of Schams, a fertile and beautiful valley of an oval form, about five miles long and two miles wide, which at its lower extremity is separated from the upper basin by another narrow gorge similar to the Rofflen, and called Maila Via. The third basin is about six miles long and three-wide, and called the valley of Domlesc; it is about 2000 feet above the sea-level, and its lower extremity again closed by a short gorge, which is about 50 yards in width, but, in the gorges they form nearly a continuous rapid, which is frequently interrupted by cataracts. It is in the upper course; with the exception of the Rhine, which is navigable by small boats. The lower course is divided into two main streams, which extend in its two principal branches. But even if their course were not interrupted by cataracts, these rivers could hardly be navigated, owing to the great changes in the volume of water, which occur very suddenly. It frequently happens that in a few hours a river rises several feet and inundates the low tracts contiguous to its banks, and in a few hours it subsides again. These changes sometimes follow each other rapidly. Small lakes are very numerous. A few of them are of great importance. None of the lakes, with the exception of Lake Constance, has a navigable basin, but are found along the outside edge of the region, so that the larger portion of the lake is enclosed by mountains, whilst the lower extremity is within the adjacent plain. Such are the lakes of Luzern and of Thun; the northern, and the Lake of Lago di Lugano and the Lago Maggiore on the southern side of the Alps. All Alpine lakes are deep; in some cases the depth is 100 fathoms. They contain few fish. The Hilly Region extends over the north-eastern portion of the country, 147 miles in length, which is bounded on the east by the valley of the Rhine, or Rheintal, by the east-bond by the Boden See, or Lake of Constance, and on the north mostly by the course of the Rhine. On the west it is divided from the region of the Jura Mountains by the lower course of the Aar, between the mouth of that river and its confluence with the Reuss. The river runs from 2400 to 4500 feet, and triangulates the valley of the Lake of Zug, separates the hilly region from the plain. The line dividing the hilly region from the Alps runs from the middle of the Lake of Zug to Mount Hoch Exel, on the southern banks of the Lake of Zürich, and thence along the river Reuss to the lake of Luzern, and thence along the Lake of Wallenstein and of Zürich, the former of which is 10 miles long, and the latter nearly 24. The level tract, which separates the two lakes, and which lies between the Lake of Wallenstein and the Rhine, are hardly more than 20 feet above the waters. Part of the country enclosed by these boundaries is mountainous. This higher tract occupies a portion of the hilly region, and may be divided from the lower portion of the country by a straight line drawn from the western extremity of the lake of Wallenstein to the place where the Rhine enters the lake of Constance. On the northern side of the low and wider valley is an extensive range of mountains, which bordering on the northern banks of the lake and descends towards it with a steep declivity, is called the Kuhflursten or Kurflursten, and terminates on the west in the elevated summit of Mount Spreer (6536 feet). It is about 4 miles wide. Its northern declivity is a continuation of the mountainous part of the eastern extremity of the lake of Wallenstein, a lower ridge, called the Grabser Alpen, branches off towards the north and connects the Kuhflursten with the mountain-group called the Alpen Dieg, which runs from 2 miles, and whose lower offsets advance to the very shores of the lake of Constance, so that in length it exceeds 15 miles. Towards its southern border are the highest summits, of which the Säntis, or Hoch Säntis, attains an elevation of 9272 feet, and has a small extent on the northern declivity of its summit. The Alte Mann, which stands east of it, is only about 200 feet lower. North of these summits there are several others, rising from 4000 to 6000 feet, but at the distance of 6 miles from the lake of Constance they sink to below 4000 feet. This range of mountains and rocks, the mountain tract resembles very much the country north of the Dödil range, except that the valleys are somewhat wider; and as the mountains do not rise to such an elevation, and have less rapid slopes, the pasture-grounds on the upland are more extensive, and the corn and grain is cultivated, but there are some fruit-trees and vines. The remainder of this region can only be called hilly, and its surface is nothing but a succession of high swells with generally gentle declivity, and rounded or flat tops. These swells are sometimes several miles long. In several places round-topped summits rise upon their backs, which are usually more numerous and higher in the vicinity of the mountain-tract, and sink lower as we advance towards the centre of the country. None of the summits rise above the sea-level, though several 3000 feet above the sea, and about 1800 feet above their base. The highest summits are arranged in small chains, which in the western districts are between the river Thur and the lake of Zürich. The most eastern chain is the Alpstein, which runs between the valleys of the rivers Thur and Tosa. It contains the Schnellenberg (3932 feet) and the Hörnli (3824 feet), and terminates on the banks of the Rhine opposite Eglisau with the Irchelberg. By the same mean the chain of the Toggenburg is connected with the Kuhflursten. The western ridge runs between the lakes of Zürich and Zug, and terminates with the Uetliberg (3850 feet), which stands a short distance west of Zürich. It contains the Schnabelaug (2760 feet) and the Albis chain, which is divided into several smaller ranges, and rises over all the adjacent countries and the snow-covered mountains of the Finsterhorn region, has given this ridge, which is called the Albis chair.
connected on the south with other sururias, which are offsets of the Dödli range, which is the Rosberg, from which a large avalanche fell in 1658, and destroyed the village of Goldau. It rises to 5190 feet. South of the Rosberg, between the lake of Zug and Luzern, stands the isolated summit of the Righi (Regina montium), which is much visited by travelers, and rises to 5016 feet. The two last mentioned mountains are within the mountain-region. That portion of this region which lies between the lake of Constance and the course of the river Thur is comparatively level, as the hills rise to a very moderate elevation, and their slopes are so gradual, that the whole of it is cultivated. This is considered to be the most fertile tract in all Switzerland, especially that part between Arbon on the banks of the lake, and Stein on the Rhine, which presents a succession of cultivated fields, vineyards, and meadows, undulating, and all other sorts of grain cultivated north of the Alps, large quantities of hemp and flax are grown, which supply the material for the numerous manufactures here and in the neighboring districts. The crops of flax are frequently got in one season from a field. The plantations of fruit-trees are so extensive as to resemble forests, and the trees attain an uncommon size. In several places the meadows are irrigated. The soil of the remainder of this region is less fertile, though in general well-drained, and the productivity is not inferior to that already described, nor larger portion of the surface is used as pasture and meadow land, as the higher parts of the chains of hills above mentioned are unfit for cultivation, and are used as pastures for six or seven months of the year. In the narrow mountain-valleys along the northern shore of the lake of Zürich it is very little inferior to the tract along the lake of Constance. There are many small lakes in this hilly country, and they contain more fish than the Alpine lakes. The largest lakes of these are those of Zürich and Lucerne. The lake of Lucerne (Lacus Riparius), which is still larger, is formed by the confluence of the rivers Reuss and Aare. On the north side the shores are extremely steep, rocky, and high, and at the distance of barely a mile from them the Kulfrichten range rises from 4000 to 5000 feet above the sea-level; on the south side the shores are also rocky and steep, but less elevated and the Mürtschenstock range attains its highest elevation at the distance of 2 or 3 miles from the lake: at the two extremities it is bordered by low tracts. The surface is 1424 feet above the sea-level. The lake of Zürich is about 24 miles long and is divided into two parts by the Zürich circle, the curvature being directed towards the south-southwest. Its mean width is less than 3 miles. It is divided by two projecting points into two sections, of which the western is called Ober See (Upper Lake): the surface is 1313 feet above sea-level. Nearly on a level tract of some extent, but with this exception, the shores are surrounded by gently-sloping hills, covered with vineyards, orchards, and cultivated fields. In a few places it is stated to be fertile, and is fished commercially. The largest rivers of this region are the Thur and Limmat. The Thur rises in a valley which separates the Kulfrichten range from the Alpstein mountains, and at first runs west, but turns gradually to the north. After a course of about 30 miles it makes a great bend to the east, and then flows westward into its confluence with the Rhine above Eglisau. Its whole course exceeds 65 miles. Nearly one-half of its course lies in a narrow but rich pastoral valley, the Toggenburg, between mountains, and the remainder of the course is安全管理 (check) and diversified with swarms and small towns. As the lake of Zürich, with the exception of the steep descent towards the lake of Geneva, presents a succession of round-backed hills or short ranges, sloping very gradually on all sides, and interspersed with open valleys, which frequently enlarge to small plains, the entire country, which is so fertile, though not distinguished by fertility, and the whole country is extremely well covered with stone, maize, wheat, barley, &c. are grown, or with orchards or vineyards. The vineyards are very extensive on the lake of Geneva, and yield some good wine. The plantations of chestnut-trees are extensive, and almond-trees and fig-trees abound.
Another swell of high ground traverses the plain in a different direction. It is connected with the Jura Mountains south of Lake Neuchâtel, and another one that runs north-west by east direction to the town of Freyburg. From Freyburg it passes south of the town of Bern, where it declines more to the east, terminating at Mount Napf, which stands on the north-western border of the mountain-region. This swell rises above 1000 to 2000 feet above the sea-level: it contains a few summits; one of the highest of them is Mount Bütschel, south of the town of Bern, which rises to 3430 feet above the sea-level. On the spine of the Jura Mountains are the few summits of the valley, the most elevated. On this spine, pastures and cultivated fields succeed one another, with orchards and vineyards. The beautiful and rich valley of the river Emme extends as far north as the vicinity of the town of Burgdorf, which is within this swell. The remainder of the plain has a gently undulating surface, the eminences rarely rising into hills, and most of the slopes being gentle. There occur also some level tracts, the largest of which is the low country between the lakes of Neuchâtel, Morat, and Bienne, which, when the rains have been very abundant, is overflowed. Within this portion of the plain only a few isolated summits occur, which rise from 1000 to 2000 feet above their base. The highest of them is the Bütiger, north-east of Bern, which rises to 3438 feet above the sea-level. This swell rises above the surrounding plain, and this in some parts, with the exception of a few summits which contain mineral springs, is represented by a broad expanse of pasture, elevated 150 to 200 feet above the general level of the plain, and is surrounded by hills, and the water which collects in them escapes by natural tunnels. On the low and narrow ridges which divide these valleys a few summits rise from 600 to 2000 feet above their base. The southern part of the table-land, which extends to the whole of Switzerland, is the most elevated, and its mean elevation above the sea may exceed 3500 feet. Here are the mountains called Reculet (5628 feet), Pré des Marmiers (5650 feet), and the Grands Colombiers (5656 feet).

The southern part of Switzerland is mountainous. Within Switzerland are Mount Dolé (5541 feet), and Mont Tendre (5522 feet), which lie west and north-west of the lake of Geneva, and Mont Chasseron (5223 feet), west of the lake of Neuchâtel, and Mont Chasseral (5111 feet), due south of Bern. This ridge of hills lies north-west of the Bienne river, which stands close to the great bend of the Doubs, and on the north-west edge of the Jura Mountains, attains only 2558 feet above the sea-level. But in the southern and central part of this region are several other summits which rise between 4000 and 5000 feet. This region, as far as it is within Switzerland, may be divided into three sections, the Southern, Central, and Northern districts.

The Southern district extends to the southern extremity of the land of Switzerland, and forms the western boundary of the canton of Vaud. In these parts the Jura Mountains do not rise abruptly from the plain, but a lower range, a kind of terrace of small width, lies between them, which is called La Côte, and in its southern parts is covered with vineyards, where the great number of its summits are found between Geneva and Morges. Further north are plantations of mulberry-trees for the use of silkworms. There are also numerous orchards, and in some parts the slopes are wooded. In the mountain-region itself there are two large and several smaller valleys. The two larger valleys are those of Joux and of Valorbe, and they may be considered as one valley, thirty miles long and about two miles wide. This valley is divided into two valleys by the summit called Dent de Vaulion, which rises 3945 feet above the level of the sea. The valley of Joux, or that south of this summit, is 3375 feet above the level of the sea. It is drained by the river Orbe, which, in approaching the Dent de Vaulion enters the lake of Joux, which is five miles long and more than a mile wide. After leaving this lake the river forms a small lake, that of Brenet, on flowing from which it is precipitated into an opening at the foot of the Dent de Vaulion, from which it issues as a considerable stream on the north side of the mountain. Here begins the Valorbe, which extends to the western boundary of the canton of Vaud. In this valley the river rises to 3000 feet above the level of the sea, then falls to 2000 feet, by which time it has reached its mouth, where it flows through the plain by which it leaves the mountain, and is at the southern extremity of the lake of Neuchâtel. In the valley of Joux, which is more than 700 feet higher than the Orbe, only gay hay and grass, are grown, and there are no trees, except a forest of fir-trees, in the upper part of the valley, which belongs to France. The greater part of the valley is used as pasture and meadow ground. The valley called Valorbe contains fine forest-trees, and is generally well cultivated, except on the slopes of the surrounding mountains, which produce grass: all kinds of fruit-trees abound.

The Central district of the Jura Mountains extends from the parallel of the southern extremity of the lake of Neuchâtel to the northern extremity of the lake of Bienne. It consists of numerous valleys, which are divided from one another by low ridges. The waters from several of them have apparently no outlet, but they sink into openings in the ground, by which means the whole of the water of the river that flows into one of the two lakes at the eastern base of the mountains. The whole region is destitute of trees, with the exception of the lower portion of the eastern slope, where there are extensive vineyards which produce good red wine, and orchards. There are also in this part vineyards, and some silk is cultivated. Here also, and in three large valleys which open towards the lakes, every kind of grain is grown, and agriculture is carried to a high degree of perfection. But the mountain-region itself, with its valleys and table-lands, is entirely uncultivated. There is also in this part of the mountains and vineyards, where the soil is dry, the pastures are rich and maintain large herds of cattle. The inhabitants of this district, as well as of the southern, are noted for their great manufacturing industry and their talent for invention. In spite of many disadvantages, among which is the long winter, that lasts s
months, these districts are among the most populous in Europe, though every article of food is very dear, owing to the difficulty of transporting it from the lower country. Within the region nothing is cultivated except barley and oats, and these only to a small extent.

North of the point of the lower extremity of the lakes of Biel and Neuchâtel, the face of the country gradually undergoes a change. The steep south-eastern declivity of the region of the Jura mountains continues along the banks of the river Aar, and in the whole of its long extent from the Leuz river to the confluence of the Rhine, a distance of 60 miles, it is only once interrupted by a valley. Though less elevated than farther to the south, it rises more than 1000 feet above its base, and has some summits, of which the Weisenset, north of Solothurn (4616 feet), is the highest.

As far as this mountain, the valleys extend longitudinally in the direction of the whole system, and resemble in some degree those of the central district, but they are partly covered with wood. North of the more abrupt declivity of the slope of the country is the north, and the numerous valleys with which it is furrowed are transverse valleys. These valleys sink much lower, and the ridges which separate them from one another are wider and have more of the form of ranges than of detached hills. They not only afford more fruitful soil, and a much more moderate climate, though a large portion of this country is well adapted for the rearing of cattle and for dairies, the lower declivities and the level grounds in the valleys and depressions produce all kinds of cultivation. Orchards also are very extensive. These three principal valleys possess a considerable degree of fertility, especially that which is drained by the Ergolz, in which Liechtau, the capital of the country portion of Basel, is situated. Many of the mountains are covered with wood. And as the declivity of the country from the Rhine begins to flow northwards, commences the plain of the Middle Rhine, which lies within France, and of which only a small district near Basel belongs to Switzerland.

Climate.—The climate of Switzerland presents great differences which are not to be ascribed to the geographical position, as the northern places are less than two degrees of latitude from the most southern. The differences are almost entirely the effect of the greater or less elevation above the sea-level. Some regions of considerable extent, as about Mount Rosa and the Finsterarhorn, rise above the line of perpetual congelation, and some of the inhabited valleys and a thousand feet above the level of the sea. On the mountain-passes which are traversed by the great commercial routes, the Gothard, Berne-Gottwald, and Splights are human dwellings at an elevation of between 6000 and 7000 feet. On the other hand, the surface of the plain is only between 1300 and 1400 feet above the sea-level: some parts of the hilly region, especially those near the borders of the lakes, below the altitude of 1000 feet, and the Rhine at Basel sinks to 800 feet, and the surface of the Lago Maggiore even to 678 feet. That portion of the area which is always covered with snow and ice probably does not much exceed 2000 square miles; but an equal area, though free from snow for a few weeks in the year, is not habitable on account of the climate. Thus we may suppose that one-fourth of the area of Switzerland is useless to man by its too great elevation and the rigour of its climate. On the remaining 12,000 square miles there are 2,000,000 individuals, which gives more than 163 to each square mile: a very considerable population, when compared with that of Scotland, which, according to the census of 1841, does not contain more than 50 individuals to each square mile.

The climate of the lower districts is more temperate than that of most countries of Germany, and the valleys south of the Alps approach very near to climate to that of Lombardy. We possess a series of meteorological observations, carried on by Berghaus, at Bern (1416 feet), Zürich (1337 feet), Geneva (1298 feet), and the Hospice on the mountain-pass of St. Gotthard (7089 feet). We have however no observations of this kind on any place south of the Rhine. Bern is only 830 square miles from the boundary-line of Switzerland, and even more elevated above the sea-level than the surface of the Lago Maggiore, we shall add the observations made at this place, as expressing with tolerable accuracy the climate of the countries surrounding the Lago Maggiore, and the lake of Lugano.

The following tables are taken from Kiitma's "Lehrbuch der Meteorologie," where they are given in degrees of the centigrade scale: they are here reduced to the scale of Fahrenheit.

**Mean temperature of every month in the year in Milan, Geneva, Zürich, Bern, and the Hospice of St. Gotthard:**

<table>
<thead>
<tr>
<th>Month</th>
<th>Milan</th>
<th>Geneva</th>
<th>Zürich</th>
<th>Bern</th>
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The mean annual temperature of London for the winter is 34° 395 for 1856; for 1857, 34° 36°; and for 1858, 34° 36°, and for the autumn 50° 29'. [Vol. xiv. p. 110.] In comparing these results it is evident that at Bern the mean temperature of every season is lower than at London, and is less to the south, with the exception of the autumn, which is higher by about a degree and a half. At Geneva the summer and spring are hotter than at London, but the autumn and winter are colder.

The mean annual temperature of these places is 55° 18° for Milan, 49° 35° for Geneva, 47° 5° for Bern, and 46° 30° for the Hospice on the St. Gotthard, and 50° 30° for London. Hence it appears that all these places, except Milan, have a lower annual temperature than London, and for Bern this difference amounts to more than five degrees. The mean annual temperature of the Hospice on the St. Gotthard is about that of the North Cape by nearly two degrees, but the summer is nearly four degrees warmer: the other seasons are colder by some degrees than at the North Cape.

**The annual rainfall in Switzerland:**

To obtain the annual rainfall in Switzerland, we have the results of the meteorological observations at Zürich for 1841; at Bern for 1842; at Geneva for 1844, and at St. Gotthard for 1845; and hence it appears that the total annual rainfall at Bern is about 80 inches, whereas at Zürich it amounts to 70.83 inches, whilst on the western side it is only 48 inches, and on the northern not more than 36.13 inches. In the south-eastern parts of England it is only 40 inches. But the number of rainy days is greater in England than on the southern and western declivity of the Alps. In England 152 such days occur annually, whilst on the southern declivity of the Alps the number is only 148, and on the western hardly exceeds 100; on the northern however there are 150 rainy days. The greater part of the annual rainfall in the southern declivity of the Alps is accumulated during the month of June, whereas in the north it is during the month of July.
Of the above 2,188,395, constituting the whole population of Switzerland, according to recent returns laid before the diet, about three-fourths speak dialects of the German, which is the language used in the diet and by the federal authorities; about 450,000 speak French, or dialects of the French of the western or Languedoc kind. From the written language as well as the spoken language of the educated classes of Geneva, Vaud, and Neuchâtel, and a part of Bern, Freiburg, and the Valais.

The canton of Ticino, and of some valleys of the Grisons, on the south side of the Alps, speak a dialect of the Italian resembling the Lombard; and one-half of the population of the Grisons speak the Romontech and Ladin, which are peculiar dialects, apparently of old Italian origin, about the history and formation of which much has been written by Father Placido d. Speca, Planta, Conradi, and other native philologists. Stadder, in his 'Dialectologie,' gives specimens of the Romontech and Ladin, as well as of the other Swiss dialects of Teutonic and French origin.

With regard to religion, more than three-fifths of the population of Switzerland follow the doctrines of the Reformation as promulgated by Zwingli, Bullinger, and other Swiss reformers, and contained in the Helvetic Confession of Faith, published in Latin, at Zürich, in 1566, and translated into French under the title of 'Confession de Foi Helvétique,' a late edition of which was published at Lausanne in 1834. There is however no obligatory uniformity among the Swiss congregations: there is no Swiss church, in the common understanding of the word; no one church, in the sense of the word, which can be attributed to Switzerland as a whole, and in which the ecclesiastical affairs are regulated by a synod or assembly of the respective pastors or parish clergy, in which the antistes or deacon or elder member presides, and it is attended in some cantons by a deputation of lay members of the executive. The synod meets at least once every year. All the cantons in which the doctrines of the Reformation are those of the majority, allow liberty of conscience and of worship to all Christian communions, whether Lutherans, Calvinists, of the Anglican church, Roman Catholics, or Moravians. Dissidents or separatists, as they are called, from the system of the reformed church have become numerous of late years in several cantons, and have their own chapels and worship. The Protestant or reformed cantons are—Aargau, Appenzell, Bern, Basel, Geneva, Glarus, Graubünden, Neuchâtel, Nidwalden, Thurgau, Vaud, Schwyz, and Zurich; all these cantons the Roman Catholics are in a minority, and in some a very small minority; but they enjoy equality of rights with their Protestant countrymen. In St. Gall the Protestants form the minority, being about two-fifths of the whole population; but liberty of conscience and political equality are secured by the constitution to the members of both communions. In Freiburg and Solothurn the Protestants form a small minority, but they enjoy toleration and liberty of worship. Lucerne, Zug, Schwyz, Uri, Unterwalden, Valais, and Ticino are exclusively Roman Catholic; it is only at Lucerne that a Protestant church has been allowed to be opened at Lucerne: the other cantons do not admit of liberty of conscience; and if any natives should embrace the doctrines of the Reformation, they are still liable to severe penalties. In several Protestant cantons, till of late years, a citizen who changed his religion lost his citizenship, but was not otherwise molested.

Natural Productions.—Two-thirds of Switzerland do not produce corn enough for the consumption: this is particularly the case in the central and eastern cantons, which lie in the higher parts of the Alps. The staple article of diet most corn are Soleure, Bern, Freiburg, Aargau, Schaffhausen, Luzern, and Vaud. Kaasthöfer of Bern, in his 'Voyage dans les Petits Cantons et les Alpes Rhétiques,' states that buckwheat ripens at an elevation of 3200 feet above the sea; and that the basins of the southern Cantons, are fitter. He also fixes the limits of the productive cultivation of maize, which is much attended to in eastern and southern Switzerland, at between 2000 and 2500 feet above the sea; and that of barley and rye at as high as 4000 feet, and still higher in peculiar situations. Potatoes are especially cultivated in the highlands. Flax and hemp are also extensively grown: but the chief territorial wealth of the highlands, and indeed of the greater part of Switzerland, consists in its pasturage and its cattle. There is nearly a million of head of horned cattle in summer, one-fourth of which consists of milch cows; and the produce of the dairy is reckoned annually at 23 millions of Swiss livres, or one million and a half sterling. The finest races of horned cattle, as those of the Helvetic and Savoyard breeds, are found in the cantons of Bern, of Gruyères in that of Freiburg, of Schwyz, of Zug, of the Frickthal in the canton of Aargau, and of Appenzell. The sheep are mostly of inferior breed, and the wool is short and coarse. Goats are very numerous in the highlands; pigs are plentiful.

The vine is extensively cultivated in the cantons of Vaud, Geneva, Neuchâtel, Zürich, Schaffhausen, Valsia, Ticino, and parts of Aargau, Thurgau, St. Gall, and Basel. The vine of some of these districts, such as Cattaioli, in the canton of Neuchâtel, La Vaux, in the canton of Vaud, and Cleusaz, in the canton of St. Gall, the Lower Valais, &c., is of a superior quality. In the highland cantons cider is made, as the country abounds with apples and pear trees. Indeed some cantons, like Glarus, are almost wholly dependent on the cultivation of the fruit, and are commonly used all over Switzerland. Carrots, beet, turnips, and other roots, as well as cabbages, are cultivated in almost every part of the country, and in some places as high as 5000 feet above the sea. Peas and beans are not so common.

Grapes are generally planted and silk worms reared in the canton of Ticino, and some valleys of Graubünden on the Italian side of the Alps. Chestnut-trees are found in sheltered situations; nut and walnut-trees are more generally grown in some parts of the same cantons. The canton Ticino, where also the fig and peach trees bear abundantly, as well as in some parts of the lower Valais, where even pomegranates and almond-trees bear fruit. Walnut-oil is the common substitute for olive-oil north of the Alps.

The highlands of Switzerland abound with timber-trees, especially firs of various kinds, maple, beech, larch, birch, and oak trees. The greater part of the forests belong to the communals; the rest belong either to the respective cantons or state, or they are in the hands of individual proprietors, or to ecclesiastical communities. There are certain forests on the declivities of the high Alps which protect the valleys beneath from the avalanches, and are therefore carefully preserved; but the rest, especially those which are commercial property, are subject to great waste, through injudicious cutting, the inroads of cattle, and especially of goats, and the ravages of storms. Most of the cottages and farm-houses are built of wood, and the same material is used for fuel, the annual consumption of which in the most wealthy cantons is at least 1000 feet. In some places in the cantons of Vaud, Basel, and Thurgau, but the coal is mostly inferior quality. Turf is used in Aargau and other cantons.

The Alps contain a rich and inexhaustible supply of water for pasture for the cattle and flocks of the greatest nourishment.
Switzerland. The pasture-land of the Jura Mountains is inferior to that of the Alps. A large proportion of land in the valleys and plains is kept as grass-fields, and mowed for winter fodder, an essential and rather dear article in a country so largely stocked with cattle. In the lowland cantons the grass is much better attended to, with respect to manuring, irrigating, and renewing than in the highlands. In the two cantons of Vaud and Neuchâtel the cultivation of the vine obtains the preference over the other branches of agriculture, and in the mountain cantons the old grass-lands are never broken up.

Iron is found in the Jura; and there are furnaces and iron-works of some importance in the cantons of Vaud, Bern, Solothurn, Basel, and Aargau, and likewise in Graubünden, but these are but a shadow of what they were in the galeries. Salt-springs abound in Switzerland, but they are generally neglected, except those of Bex in the canton of Vaud. [Bex.] Switzerland imports much salt from Germany and other countries.

The mineral-waters of Leuk in the Valais, of Baden and Schinznach in the Aargau, of Gurnigel near Bern, of Lavey, in the canton of Vaud, of Pfeffers, in the canton of St. Gall, and of Moriz, in Graubünden, are all well known and much frequented by invalids during the summer season.

The lakes and rivers of Switzerland abound with fish, especially trout of various kinds. In the lakes of Geneva and Constance there are trout that weigh from 30 to 50 lbs. The luciole in the Grisons, the Rhine, and the river of Zürich; tench, carp, perch, eels, and crabs are found in most Swiss waters.

The game consists chiefly of chamois, hares, marmots, and partridges. Bears and wolves are hunted in the Alps and cantons; and prey of large dimensions are common in the mountains.

Trade and Manufactures.—Switzerland has been, at least in part, a manufacturing country for centuries. Manufactures of woollen and linen cloths existed at St. Gall and in the canton of Appenzell in the thirteenth century. At the same epoch Zürich manufactured and exported large quantities of silks and woollens. Silks, woollens, and linens were made at Basel in the sixteenth century; and Geneva manufactured the same at the same time silks, lace, jewellery, and the cutlery. In the seventeenth century clocks and watches began to be manufactured in the mountains of Neuchâtel. These and other like branches of industry have had their vicissitudes; some have failed in certain localities and others have sprung up in their place; but Switzerland has never ceased to be a manufacturing country to a considerable extent ever since the thirteenth century, and the general amount of its manufacturing industry has greatly increased in the last century. About the middle of the eighteenth century cotton was introduced into the Swiss manufactories. In 1800 the first spinning-machine was established at St. Gall, and improved methods in weaving, bleaching, and dressing of cloth were soon after introduced. New spinning-machines were then introduced, and improved in Switzerland, it appears that the cantons of Appenzell and St. Gall alone still take from England annually about one million pounds weight of cotton-yarns. The principal branches of Swiss manufacture at present are as follows:

In the canton of Zürich the manufacture of silks, foretinens, gros-de-Naples, taffetas, serges, levantins, silk handkerchiefs, and ribbons, gives employment to between 12,000 and 13,000 persons. The total annual value of the manufactures of Zürich is reckoned at about seven millions and a half of florins, or about 600,000l. sterling. Rarely are there a number of looms at work collectively; almost all are to be found singly, or two together, seldom even three or four; but in the common spinning-mill of the Zürich employ about 12,000 weavers, 5000 spinners, besides 4000 persons engaged in other trades connected with the cotton-manufacture. About 600,000 pieces of cotton are manufactured yearly. There are nineteen printing establishments, which employ about 1000 workmen, and print about 100,000 pieces of cloth yearly. Zürich and Winterthur and the villages along the banks of the lake are the principal seats of manufacturing, especially of the silk manufacture. The Spinner's and woollens and linens, which were once important, are now reduced to insignificance.

The canton of St. Gall, and that of Appenzell, which is enclosed by the former, constitute another important manufactory, especially woollens. The Silversmiths of Zürich alone has about 10,000 looms, and it is calculated that about 10,000 pieces of cloth of 16 ells in length are manufactured every week. Part of the workman's time is employed in household and field occupations, as at Zürich. By the manufacture of gauze, and some of the finest cloths, Appenzell, are the chief manufacturing places. They make some very fine muslin, both plain and embroidered. St. Gall also manufactures muslins and prints in considerable quantity. The other manufactures of St. Gall are leather, linen, glass, and goldsmith-ware. A considerable foreign trade is carried on with Italy and Germany, and St. Gall has several substantial mercantile houses.

The city of Basel forms another emporium of trade and manufacture, principally of woollens. There are about 2700 chaffet, and satins. There are from 3500 to 4000 looms in activity. The annual exportation of rubbons from Basel amounts to about ten millions of francs, of which one-half is sold to the United States, and the rest to Germany, at least 120,000 yards of velvets, and a large quantity of heavy stuffs, sold from Wilhelmsbad, and other small places. The manufacture of basel are leather, paper, and tobacco. Basel carries on considerable business with foreign countries, and has several wealthy banking firms and capitalists.

Schaaffhausen has a manufacture of steel and files, which is most great; and one of cottons, chiefly made for the exportation. Andermautz and Saleshausen have a manufactory of cottons, chiefly made for the exportation. Schaaffhausen is also a place of transit and depot of Swiss goods exported to Germany, and German goods imported into Switzerland. The principal goods imported are silk, laces, woollens, stuffs suitable for warm weather, and leather, from Bohemia and Saxony, and Nürnberg manufactories. The Swiss send to Germany cheese, silk and cotton goods, and also wine, and kirsch-wasser; but the trade with Germany is now much checked by the heavy duties imposed by the Continental aristocrats, and the new plans are made for the exportation of Swiss goods to foreign countries.

At the opposite extremity of Switzerland, Geneva is a great mart of trade and industry. The Manufactures of Geneva consist chiefly of chaffets, jewellery, and musical boxes. About 100,000 chaffets, mostly gold watches, are annually manufactured, principally of parts of the clock, and finished at Geneva, in order to be sold from thence to the clock manufactories of other countries. About 20,000 pawn shops, in Geneva, carry on a very active business. The sale of watches is very vast, and several of the old houses of trade have been settled for many years. The manufacture of Swiss watches is the extreme of perfection and delicacy. The watches are sold to Asia and India, to America, to Italy, and to Germany, and are exported in large quantities. The average price of 100,000 chaffets, or 10,000 watches, of these three classes, to whom a costly watch is inaccessible. (Dr. Bowring's Report.)

The other branches of manufacture at Geneva are cabinets, engraving, brass work, arms, et al. There are at Geneva many respectable mercantile houses, banking-houses, bill and stock brokers, and a number of capitalists, who invest their funds either in foreign stocks, or place them in mercantile houses, or enjoy the profits of the manufacture, from which they derive a fair and moderate profit. The chief branches of manufacture are: 1. the printing of cottons, the cloth being furnished chiefly from the Zürich looms. About 60,000 pieces are printed...
yearly, and are exported chiefly to Prussia, Holland, Belgium, and Italy. 2. Lace-making, which once occupied a great proportion of the female sex, but which has greatly declined. 3. Watch-making, which has greatly increased within the present century. From 100,000 to 120,000 watches are yearly manufactured in the canton of Neuchâtel, in the districts of Lode and La Chaux de Fonâ, among the highlands of the Jura. About one-third of the watches are gold, and the rest silver; the silver watches as low as from twenty to twenty-five francs apiece. The principal exports are watches, learned books, and wax candles, as well as new religious books, to Prussia and other states of North Germany, and to Russia. Since the reduction of the duties, Neuchâtel and Geneva watches are introduced into France through the customs, for which they are charged with great quantities. It is calculated that, from 9,000 to 20,000,000, are annually alive by the manufacture of watches in the canton of Neuchâtel.

The canton of Turgau has from 3000 to 3500 looms employed in weaving cotton-goods, several spinning-factories, several factories for cotton-printing in the neighbourhood of Frauenfeld, and also factories of linen, which branch however has much declined.

The small canton of Glarus manufactures a considerable quantity of silk, which is sold in ribbon, prints, and curtains.

Aargau manufactures cotton-cloth of all descriptions, white and coloured handkerchiefs, prints, stockings, and other hosiery, also silks and ribbons, and silks mixed with wool and cotton, linens, and cutlery.

The trade of Switzerland cannot be considered as manufacturing countries, although most of them have some manufactures, but none of great importance, and only to supply their own wants. Bern manufactures goods, but produces little, as well as native writers; for whatever may be the cause or causes of it, the fact is undeniable, and it attracts the notice even of the passing traveller. It cannot be merely owing to the difference of soil and climate, as Freyburg is as much covered by mountains, and the air is as much urged by torrents as it is in the farthest district; nor can it be supposed that the contrast is striking across the borders. Francisci, of the canton of Ticino, himself a Roman Catholic, and a priest, admits the fact; and he attributes it to various causes: 1st, that, the only cantons of the kingdom who are supported by the people in the Roman Catholic cantons. The Protestants have one incumbent for each parish, and few curates or curators. The Roman Catholic parishes are generally smaller, and therefore the incommensurability is very great. Besides, the Roman Catholics, in both islands and chapels attached to particular chapels, for several priests say mass in the same church: there are also the chapters of collegiate churches; and lastly, many convents, especially of mendicants, whose inmates are supported entirely by public contributions. In Protestant Switzerland there is upon an average one clergyman for every 700 inhabitants; in Roman Catholic Switzerland one for every 150. The Protestant population of Switzerland, which is three-fifths of the whole, comprises between 1600 and 1700 ecclesiastics; whilst the Roman Catholic two-fifths comprise 5200, besides about 2000 nuns. In several Roman Catholic cantons, especially the mountain cantons, the parish priest is poorly paid, and he adds to his pittance by fees and other contributions, which are not always paid. At some times, says Francisci, by working on their credulity. 2nd, The numerous convents, about sixty in all, several of which have large landed property, which, according to Francisci and Leresche, is ill administered and ill cultivated. The wealthiest convents in Switzerland are those of Einsiedlen in the canton of Schwyz, Muri and Wettingen in Aargau, and St. Urban in the canton of Luzern. The government of Aargau has lately attempted some economical reforms in the convents, especially those of Muri and Wettingen, which have each a property of about two millions and a half of Swiss livres, or about 150,000 pounds sterling, but it has met with great opposition, and the affair has been lately brought before the federal diet. 3. Education. This canton's statistics are given by the Roman Catholics than by the Protestants, especially in those branches which are connected with commerce and industry. 4. The Roman Catholics spend much money in building and ornamenting churches, parishes, or chapels in each of them, and a quantity of costly utensils, clerical dress, and appendages and votive offerings. Many of them also pay for dispensation from fasting during Lent, &c. 5. The Roman Catholics spend much time in church, and a great many of them attend morning services every day: there are also processions, pilgrimages, and other practices, which, though not expressly commanded by their religion, are recommended as meritorious. 6. The Protestants abstain from work only on Sundays, but the Roman Catholics have between 40 and 52 days in the year, during which, not only do they not work, but their cattle and their mills remain inactive. Francisci, by multi-
aplying these holidays by the number of persons able to work, calculates the total loss at about eight million days of labour in the year. At the same time these unproductive days occasion an additional expenditure, or rather waste, eating and drinking, to the total loss thence double. These
aphores, Francisconi observes in conclusion, do not belong to the essentials of religion: they are extraneous matters of discipline, which might be reformed. (Francisci, Statistica della Svizzera, lib. VII, c. 1 and c. 2.)

1. The organization of institutions, habits, and manners, the political life of the Swiss as an independent confederation of republican states for more than five centuries has given to the whole something of a national char-

ter, which distinguishes it from that subject of the great extent states which surround it. The Swiss in
general are fond of their country, and feel proud of being Swiss. We find amongst all, both in the mountains and the plains, a frank bold bearing and gaiety, and freedom of sentiments which proclaim them as citizens of a free country. There is also a love of domestic comfort, propriety, and of the
decencies of life, among all classes, and in a greater degree than is found among the corresponding classes in France or Italy. The difference in the appearance of the country and the attire of the Swiss, and their
care full, the traveller who crosses the Jura or the Alps into Switzerland. The feeling of order, the habit of reasoning and discriminating, the steady, slow perseverance, the disposition to guard and improve the nation, thoughts, the shrill and human, distinct from cunning and wit, all which are qualities generally characteristic of the Teutonic nations, in great measure belong also to the Swiss, who are for the most part descended from Teutonic races. The Swiss are speaking, warring and hereditary, they are kind to strangers, and their country can boast of having been in all times a land of refuge for the unfortunate and the persecuted. The Italian Protestants in the sixteenth century, the Valdenses, the French Prot-
estants who were driven out of their country by the intolerance of Louis XIV. in the seventeenth—all found an hospit
table reception in Switzerland. The Roman Catholic emi-
grants, priests and laymen, who escaped from France at the
time of the great Revolution, found sympathy and assistance from the same Swiss. The emigrants from Protestant and Catholic times political emigrants of various countries, both in the
time of Napoleon and since the restoration, have taken refuge in Switzerland, not without the risk on the part of that country of being involved in hostilities with powerful neigh-
bouring states on account of the imprudent and guilty con-
duct of several of the refugees. In our own times subscrip-
tions to the amount of nearly 800,000 francs were collected in Switzerland for the cause of Greek emancipation.

The Swiss were always inclined to accept charity, and to 
favour their poor, and to establish religious and moral order, society was a vocation. They were thus better able to

secure the services of artillerymen in 1693-1695, 25,000 of whom were infantry of the line, 2000 carabiniers, 3000 wagon-train, 730 cavalry, and the rest pioneers, pontoon-men, &c. The cavalry is small, because it has been supposed that on a ground like that of the

Swiss there is no opportunity for its use. 2. The reserve consists of an equal number of men, distributed nearly in the same proportions as in the contingent. It consists of men who have done their duty for several years in the contingent, and it is liable to be called out in case of emergency, on the summons of the federal government. As a last resource for the defense of the country, the levée en masse, called 'landsturm,' includes all men who are able to bear arms. A small pro-

portion of the contingent are called upon by turns to do local duty in the respective cantons. Several cantons have also a small body of gendarmes, or armed policemen, regularly enlisted and paid. The men, both of the contingent and the reserve, are mostly armed at the public expense, or, if too poor, are sup-

plied with arms by their respective cantons.

There is for all Switzerland a 'federal military commission' appointed by the diet, and renewed every three years: it consists of a president and four members, who are field-

officers. The commission has the power to determine and reserve of the various cantons by turns, as well as the military schools existing in several cantons, and make their reports to the diet on their condition and efficiency, and to suggest improvements. There is a school for the artillery and en-

gineers of the whole confederation at Thun, in the canton of Bern, in which about 40 officers and 180 non-commissioned

officers and men are instructed in the scientific part of their
profession. The expenses are defrayed by the federal fund. This fund is supplied out of a small duty levied by the federal government upon all goods sent out of the country. Every canon is also bound to pay, in proportion to its population and wealth, a quota in money for the ordinary federal expenditure, and for the support of the troops when called into active service by the federal government.

Education and Instruction—Elementary instruction has been greatly ameliorated of late years in many of the Swiss cantons. Those which have made most improvement in this respect are Zürich, Basle, Schaffhausen, Geneva, and Vaud, in which the number of pupils of the elementary schools in every hundred in the population of the whole population. The cantons which are most behind in this respect are Uri, Schwyz, Unterwalden, Appenzell, the Grisons, Ticino, and the Valais. Many parishes have no school: the parish priest gives some sort of instruction to the children, but it is neither regular nor sufficient, and the number of illiterate persons is very great.

At Basle, Geneva, and other towns, Sunday-schools have been established for the children of the poor. At Bern and other places are schools which have been useful in their respective trades, who cannot attend the day-schools.

The cantons of Vaud, Aargau, Schaffhausen, Zürich, Luzern, Soleure, Grisons, and some others, have schools for the instruction of the children of the country; in some of the smaller country communities, the schoolmasters are miserably paid. The best paid are perhaps those of the cantons of Zürich, Aargau, and Vaud, but the utmost which they receive as salary seems to be 200 Swiss livres, or 15 pounds sterling, per annum.

The secondary or gymnastic instruction is given in the gymnasia, which exist in most of the bead towns of cantons, besides secondary or grammar schools in most of the other towns. There is however a great difference among them as to the manner of instruction. In some the old system is followed: Latin, rhetoric, and little more, are taught. In others, such as Zürich, Basle, Bern, Vaud, Geneva, Neuchâtel, Aargau, Appenzell exterior, Schaffhausen, and St. Gall, gymnasia have been established, for those who are intended for the higher walks of life, and not literary, or 'Real-schulen,' and schools of arts, for the others. Modern languages, drawing, history, geography, natural history, rural economy, and music are taught in many of these gymnasia. They are of various kinds, and have illustrated by the education of a country, and the country, and the number of gymnasia established, as well as the number of students.

History of Switzerland.—The greater part of modern Switzerland was known in the Roman time by the name of the country of the Helvetii. The Helvetii were a Celtic or Gaulish people, and are mentioned by Caesar (Bell. Gall., l. 7, 12.) as one of the most warlike nations of the Helvetii. Caesar says that they were divided into four pagi, or tribes, of which he names two, the pagus Taurinorum, and the Ubigenus or Verbigenus. The modern towns of Zürich and Berne are supposed to have derived their names from these two pagi. The eastern part of Switzerland, or the present Grisons country, was called Rhätia by the Romans, and was inhabited by a different race of men, who are said to have been descended from the Iberians.

The Helvetii appear for the first time in history about 110 B.C. The Tigurini having invaded the Cimbric in their invasion of Gaul, the Roman consul L. Cassius was sent with an army against them. He met the forces of the Tigurini some say near the Arar or Saone, according to others near the eastern bank of the Leman lake; but he was defeated and killed, together with his legate Piso, and most of his men. The rest made a capitulation, by which they were allowed to return home, after passing under the yoke. (Livy, Epitome, 63; Caesar, Bell. Gall., i. 7, 12.) About the beginning of a century, Gaul was divided among them and sold to the fiercest regions of Gaul. They burnt their towns and villages, and passed through the country of the Sequani until they reached the Arar, where they were opposed and defeated by Caesar near Ribemont, or many years, and the country was divided into the country of the Helvetii; but it appears, by Tacitus (Hist., i. 67) that the Helvetii retained the right of keeping garrison in some of their own strongholds, and it was the incapacity of the 21st legion, which was ordered to its service, that caused the defeat of the Helvetian garrison, that was the first cause of the fatal insurrection of A.D. 69. After the legions of Germany had proclaimed Vitellius, and Cæcina, one of his legates, was marching with a strong force towards Italy, the Helvetians.
who were not yet acquainted with the events at Rome and
the murder of Galba, in the east, which were written
in several regions of Germany to the legions of
Pannonia, and which invited the latter to join Vitellius,
and they arrested the centurion and his escort as guilty of
treason against Galba. Upon this Cucina, who had just entered
the territory of the Helvetii, on his way to Italy, defeated
the country, destroyed the Thermo Helvetiae (modern Baden,
Aargau), and advanced against the main body of the
Helvetians, who were in arms, and had chosen a certain
Flavius Severus for their leader. At the same time he sent
word to the Romans stationed at the Rhine to march in
the rear of the Helvetians, whilst he attacked them in front.
The Helvetians had been long subject to Rome, having been
conquered by Drusus under Augustus. The Helvetians
made no stand against the Roman legions, and they were
massacred. Some escaped to the mountains, where they were
hunted by the Thracian and German auxiliaries,
and by bodies of Rhine light troops, who seem to have
wilfully turned their arms against their Helvetic neighbours.
Those who escaped were sold as slaves.

The town of Aventicum, one of the first in Helvetia, sent
messengers to Cucina, with an offer to surrender; but
Cucina sentenced the principal inhabitants to death, and
one Julius Alpinus among the rest. His daughter, Julia
Aventia, was a goddess of the land of Helvetia, and
in vain interceded with Cucina for her father: he was execu-
ted, and she does not seem to have long survived her
parent. A sepulchral inscription in Latin, found many
centuries after among the ruins of Aventicum, revealed
the tomb of Julia Aventia, to this purport:—"Here lies Julia
Alpinus, lie buried, the unhappy offspring of an unhappy
father. A priestess of the goddess Aventia, I could not
succeed in rescuing my father from a violent death: he was
condemned, 20 years ago, to an undying sentence of
twenty-three years." After this execution, Cucina marched
on towards Italy, referring the people of Aventicum to Vi-
tellius himself, who would pronounce upon their doom.
The Helvetic envoy, at the head of whom was one Claudius
Cecina, went to Italy into the camp of Vitellius and
sailed by the order of the soldiers, who demanded the
destruction of the whole people. Vitellius himself looked
stern and threatening, so that, says Tacitus (Hist. i., 69),
it was difficult to say whether the emperor or the soldiers
appeared most menaces. Claudius Cecina, a man known for
his eloquence, avoided all oratorical attempts at excusing
the past; but by the display of his grief and fears and hu-
miliation, he turned the hearts of the soldiers, who now
came to the emperor to forgive the Helvetians, and be
given as last was granted. And now the tide of war
rolled on towards the plains of Italy, and the Helvetians
were left to recover from their calamities. Vespasian,
who succeeded Vitellius, had lived when a boy at Aventicum
with his father, and, on one occasion, he wrote a letter to his
father, as if he had died there. After Vespasian became emperor,
he remembered Aventicum, and embellished and enlarged
that town. Nothing particular occurred in Helvetia till
the beginning of the fifth century of our era. During this
long period the Roman language, Roman habits and man-
ers, became prevalent throughout Helvetia, though it is
supposed that the more central valleys and Alpine recesses
retained a sort of rude independence, as Roman stations
have been traced forming a line at the foot of the high
Alps, which seem to have extended from the lake of Wal-
lenstadt to that of the Waldstätter, where Luzern now is,
and from thence to the highlands of Bern, as if to guard
the open country against the intrusions of the mountaineers.

At the breaking up of the Western Empire, the Burgundians,
a tribe from the shores of the Baltic, were the first to
form a permanent settlement in Western Switzerland, be-
tween the Jura, the Leman lake, and the river Aar,
and Gobena, or Geneva, became the occasional residence of
the burgundians, and the Alemannia. Burgundia was
a wider and more barbarous race than the Burgundians,
occupied the banks of the Rhine as far as Eastern Helvetia,
until being defeated by Clotilda, wife of the Franks, at Toll-
burg by the Danube, and was forced to leave the
country which the Alemannia had occupied, including
a great part of Helvetia. The mountainous district of
Rhetia was seized upon by the Goths from Italy, under King
Theodo. The old natives of Helvetia themselves became by
turns subjects or serfs of these various masters: being no
longer a nation, they very name became obliteratred, and
they were included in the general appellation of Romans, by
which the northern conquerors designated the inhabitants
of the countries once subject to Rome. About a.d. 534, the
Franks, having overpowered the kingdom of the Burgund-
ians, became masters of all Helvetia, and soon after, at
the breaking up of the Gothic kingdom of Italy, they occupied
Rhetia also. The Burgundians, being the first of the
Franks, made conditions for themselves, by which they
remained as a distinct nation, retaining their laws, usages,
and privileges: the king of the Franks assumed the ad-
nominal title of king of Burgundy. Several governors
were appointed by the Merovingian kings of the Franks to govern the various divisions
of Helvetia. That part of the country which belonged to
the kingdom of Burgundy was called Transjura Burgundy,
and the country was subject to the king of Burgundy.
Rhetia, Alpinula, and Alemannia, and Rhetia formed another distinct division.

When the Frankish empire became divided into several
kings, Transjura Burgundy formed part of the king-
dom of Orleans, while the rest of Helvetia was attached to
the kingdom of Austria or of Metz.

Christianity does not seem to have been introduced into
Helvetia at a very early period, especially into Eastern Hel-
vetia. The Burgundian part became converted to Chris-
tianity soon after the establishment of the Burgundian
kingdom, and the Alemannia part of Eastern Helvetia remained much longer in the condition of hunters and shepherds, and in the rude hea-
thenism of their Teutonic ancestors. Towards the begin-
ing of the sixth century, the Franks, driven by some of their kings, came from France to preach the Gosp
el to the Alemannia of Helvetia, and as they made progress among them, they broke the images of their god Wodan,
and built chapels in various parts of the country. This
was the original source of the Christian church. I have
mentioned St. Gall, Disentis, Sankt Gall, or St. Hilarusb,
St. Leodegav of Luxemur, and the Münster of Zürich.

The piuous monks taught also the rude natives to cultivate
the soil, to sow corn, to plant the vine, and other useful
arts.

Under the Burgundians, the church of the country was
an integral part of the State. The immediate church
system was thoroughly established in Helvetia, as well as in
the other parts of the Frankish monarchy. The counts or
governors made themselves hereditary; they became suzerains of their respective districts, of which they were before
only magistrates; they took possession of the crown lands,
and received the fees of the crown tenants, who became
vassals of the local lord. The abbots and monasteries like-
wise had their own vassals, many of whom, being originally
the retainers of the count, were converted into a kind of
 superiority, preferred placing them-

under the protection of the church.

When the Frankish empire became divided among the
successors of Louis le Débonnaire, A.D. 840, German or
Eastern Helvetia fell to the share of Louis of Bavaria, and
Western Helvetia and Transjura Burgundy to Charles the Fat, called St. Maurice in the Valais.

The bishoprics were laid in their present shape by these
and afterwards by the em-
peror Arnulf at Regensburg, A.D. 980. This new
kingdom of Burgundy lasted till 1018 when Rudolf II., called
"Iguinus," being at variance with his vassals, and having no
male issue, makes over his kingdom to the emperor Henry II., and thus all Helvetia becomes annexed to the German
empire.

A.D. 867. Berthold of Zähringen, a great Swabian lord,
is made by the emperor Henry IV. "kastvogt," or warden,
of the town and district of Zähringen and other places in Eastern Helvetia, and afterwards his son Conrad of Zähringen is made landgrave of Zähringen.

1152. Frederick of Hohenstaufen appoints Berthold IV. of
Zähringen imperial warden of the bishoprics of Lauanna,
Geneva, and Sion. The administration of the House of
Zähringen over the greater part of Helvetia is wise and pro-
perous.

1178. Berthold IV. of Zähringen builds Freiburg,
1191. Berthold V. encloses the town of Bern.
1218. Frederic II. gives imperial charters to the towns of Bern, Solouer, Basel, and Schaffhausen. The principal lords in Helvetia are the counts of Savoy in the south, the counts of Brandenburg and of Neuchâtel in the west, and the counts of Toggenburg and Kyburg in the north.
1254. Rudolf of Habsburg by various inheritances becomes one of the most powerful lords in Helvetia.
1273. Rudolf is elected emperor. He favors the independence of his vassals.
1291. Death of Rudolf. His son Albert attacks Bern and Zürich, but is repulsed. He aims at annexing the free towns and districts of Helvetia to the patrimony of the House of Habsburg.
1300. The three Waldstätter, or forest, cantons, Schwyz, Uri, and Unterwalden, which had been for ages free communities under the protection of the empire, refuse to acknowledge Albert as their duke. The appeal to their imperial franchises, and demand imperial Vogten, or judges, to be sent to them to administer justice, and not ducal ones, as Albert wished.
1304. Albert sends them for imperial Vogten two noblemen who were devoted to him, Gessler and Beringer, who conquered them without effusion of blood.
1307. Three leading men in the Waldstätter, Werner Stauffacher of Schwyz, Walter Furst of Uri, and Arnold von Melchtal in Unterwalden, conspire to free their country from the supremacy of Albert's Vogten. They meet on the Röti, and take an oath to that effect. William Tell kills Gessler. [Tell, William.]
1308. January. The insurrection breaks out throughout the Waldstätter. Albert's officers are driven away, and their cantons seized without bloodshed.
May, 1308. Albert, whilst preparing to march against the Waldstätter, is murdered by his own nephew John of Habsburg, whose patrimony he desired. [Albert I., duke of Austria.]
1308 (November). Leopold, son of Albert, defeated at Morgarten by the people of the Waldstätter, who begin to be called by the general name of Schwyzer.
1315 (December). Federal pact of Brunnen, among the three Waldstätter.
1318. Frederic, duke of Austria, makes a truce with the Waldstätter.
1332. The town of Luzern, which had been subject to the House of Habsburg, joins the confederation of the Waldstätter as the fourth canton.
1339. League of the feudal nobles against Bern. They are defeated at Laupen by the Bernese militia, under Rudolf von Erlach.
1351. Zürich and Glarus join the confederation as the fifth Swiss canton, and the Züricherches defeat Duke Albert of Austria.
1352. The town of Zug, belonging to the Duke of Austria, being besieged by the Swiss, agrees to join the confederation as the sixth canton, and Bern joins the confederation as the eighth canton. A federal Diet of deputies from the eight cantons is appointed.
1375. Enguerrand de Coucy, a French noble, with an army of adventurers, French and English, called Guglers, invades Switzerland, and is defeated by the Bernese at Frauenbrunnen.
1386. Leopold II. of Austria Marches an army against Luzern, and is defeated and killed at Sempach, on the 9th of July.
1388. The Austrians invade Glarus, and are defeated at Näfels.
1399. True of twenty years between Austria and the Swiss.
1393. The Sempacher brief, or resolutions concerning military discipline, agreed to in a Diet of eight cantons held at Sempach. Meantime Bern and Zürich extend their territories by purchase from the neighbouring lords.
1404. Luzern purges itself of the Duke of Austria, his seignorial rights over the Entibuch and other districts.
1405-8. Revolt of the district of Appenzell against the abbot of St. Gall.
1415. Frederic of Austria is excommunicated by the council of Constance, and put under the ban of the empire. The emperor Sigismund invites the Swiss cantons to seize the territories of the House of Austria. They invade the Aargau, which they divide among themselves. Origin of the subject bailiwicks.
1418-22. The people of the Waldstätter invade the Val Levantina and other valleys south of the Alps, which they constitute subject bailiwicks.
1425. The Swiss coalition against the lord of Aron, and becomes an independent state allied to the Swiss cantons.
1424. The Gruweibung ('Grey league') formed at Trun gives its name to the whole of Switzerland. [Grayhundenstein.]
1436. Death of the last count of Toggenburg; disputes about his inheritance. Civil war between Zürich and the other cantons.
1444. Siege of Zürich by the confederates. A large force of mercenaries under the Dauphin (afterwards Louis XI.) attack Basel. Battle of St. Jacob. The Dauphin makes peace with the Swiss.
1446. Peace between Zürich and the other cantons.
1452. A fresh war between Austria and the cantons. Austria loses Rapperschwil, Freiburg, and Thurgau. Duke Sigismund of Austria mortgages to Zürich the town of Winterthur, his last remaining possession in Helvetia.
1457. Michael Habsburg, an imperial town of Alsace, forms an alliance with the Swiss.
1475. War between the Swiss cantons and Charles le Téméraire, duke of Burgundy.
1476 (March). Battle of Granson; the Burgundians are defeated.
1476 (June). Battle of Morat; total defeat of Charles.
1478. Battle of Giornico, in which the Swiss defeat the troops of Milan.
1495. The emperor Maximilian I. attempts to enforce the ordinances of the Imperial chamber upon the Swiss as liesges to the emperor; the Swiss refuse to consider such a contingent of troops for his war against France. The Swiss refuse, and allege their previous treaties with France.
1499. War between Maximilian and the Swiss. The Imperial troops being defeated near Bregenz, at Prasstanz, and other places on the borders of the Tyrol, and also at Dornach near Basel, Maximilian makes peace with the cantons. This was the last war which the Swiss had to sustain for their independence.
1501. Basel and Zürich are received into the confederation as two additional cantons.
1513. Appenzell is also admitted, and completes the number of thirteen cantons composing the Helvetic or Swiss confederation. which existed till the French revolutionary revolution of 1798. The Swiss, or states associated in the confederation with vote in the diet, were the abbot of St. Gall, and the free cities of St. Gall, Mühlhausen, and Biel, or Bienna. The allies without vote were Geneva, Neuchâtel, the Valais, and the free towns.
1511-1522. Swiss troops engaged in the wars of Italy as auxiliaries of the Sforza, dukes of Milan, and of the pope, against the French. Battle of Novara won by the Swiss. Battle of Marignano; the Swiss make a good retreat, after sustaining a great loss of men, and making a great slaughter of the French. Battle of La Roocca, April, 1512, won by the Swiss, who, in concert with the troops of Charles V., drive the French out of Lombardy.
1518. Sale of the indulgences in Switzerland, opposed by Zwingi.
1519. Zwingli, Bullinger, and other Swiss reformers enter into a controversy with the church of Rome. [Zwingli.]
1523. Zürich adopts the doctrines of the Reformation.
1529. Bern, after several conferences, issues an edict of reformation consisting of thirteen articles. The towns of St. Gall, Bienna, and Mühlhausen adopt the reformation.
1530. Basel and Schaffhausen proclaim the reformation; Glarus and Appenzell remain divided between the two communions.
Farel preaches the Reformation in Western Switzerland. Neuchâtel adopts his doctrines. 1531. War between the Roman Catholic and the reformers. The former are driven out of St. Gall. The troops of the reformed cantons
Wielding, who, attended as chaplain, is among the killed. Peace of Bex, on the principle of reciprocal non-interference.

1532. Helvetic confession of faith proclaimed by a synod held at Bern.


1534. Savoy, as an ally of Geneva, makes war against the duke of Savoy, who claimed supremacy over the latter town.

1535. Bern takes the Pays de Vaud from the duke of Savoy.

1537. John Calvin goes to preach at Geneva.

1538. Calvin and Fasel expelled from Geneva. [Calvin, John.]

1541. Calvin is recalled. The Reformation adopted at Geneva.


1592. Charles Emmanuel, duke of Savoy, attempts to surprise Geneva by escalade, and is repulsed with loss.

1603. New treaty between Geneva and Bern on one side, and the duke of Savoy on the other. The duke acknowledges the independence of Geneva.


1620. Massacre of the Protestants in Valtellina.

1621. The Austrians invade the Grisons.

1624. The French come to the assistance of the Grisons, and drive away the Austrians.

1626. The Austrians again invade the Grisons country, and two years after they withdraw.

1639. End of the war of the Grisons.

1648. The emperor acknowledges, in the treaty of Westphalia, the Swiss Confederation as an independent state in Europe.

1653. Peasants' war in Switzerland; the insurgents are defeated.


1658-63. A number of French Protestants persecuted by Louis XIV. take refuge in Switzerland. Most of the Waldenses of Piedmont emigrate to Switzerland, to avoid the persecution of the duke of Savoy.

1670. The district of Toggenburg revolts against the abbot of St. Gall, and is supported by the Reformed Cantons.

1712. Third and last war of religion in Switzerland. The Bernese defeat the troops of Luzern and the Waldsieter at Willmergen. The Roman Catholic cantons sue for peace, which is concluded in August, 1712.

1713-9. A period of peace for Switzerland, with the exception of some local disturbances at Bern, Freiburg, and Geneva.

1733. The massacre of the Swiss guards at Paris. The other Swiss regiments in the French service return home.

1739. The French invade the territory of the bishop of Basel, and annex it to their new republic. They also foment an insurrection at Geneva, which is followed by massacre and confiscation.

1755. The French executive Directory begins to annoy the Swiss Confederation. It encourages the disaffected in the Pays de Vaud against Bern, and the disaffected in general all over Switzerland.

1777. General Bonaparte seizes upon Gavone, Chiavenna, and Bormio, which were subject to the Grisons, and annexes them to the Cisalpine republic. In the mean time another body of French troops occupies the free town of Bienne, an ally of the Swiss. The Directory assemble at Genoa, and direct the American war against the United States, in which they are assembled for that year, and which is styled the Vorort, or directing canton, to carry into execution its resolutions, and otherwise to provide for the well-being of the confederate nation. As the time that is made is the year 1789. The Vorort is assembled in its duties by a federal chancellor, consisting of a chancellor and a secretary, both of whom are appointed by the Diet. In urgent cases, or simply on the demand of five cantons, the Vorort convokes an extraordinary diet.

1790-31. Most of the larger cantons, whose representation was based upon the principle of property, effect a change by which universal suffrage is established. The proposed change finds a strong opposition in Basel, in consequence of which the two separate itself from the confederation, and which form themselves into a separate republic, or half canton. Neuchátel, after some bloodshed, retains its old constitution under the king of Prussia, who is prince of Neuchâtel. Geneva retains its constitution with a small alteration. It assembles for elections in its own form, and its pure democratic form, with general assemblies of the whole male population. Attempts are made by the radical party to change the federal pact, which are resisted by the majority of the cantons, and especially by the Forest cantons.

1834-36. Disturbances in several parts of Switzerland, caused by the Polish and other political refugees, who attempt to effect revolutions in Savoy and other neighboring states. Angry disputes arise between the directory and the cantons with respect to the diet, which at last directs the expulsion of these refugees, who had been guilty of revolutionary attempts, and other acts endangering the neutrality and tranquillity of Switzerland.

For the history of Switzerland during the middle ages,
Johann Müller's Geschichte der Schweizerischen Büdigen-
enschaft is the best work. A spirited French translation
of it, with valuable notes and a continuation down to our
times, by Professors Monod of lausanne and Vi-
liemin of Basel, has been in course of publication of late
years at Paris and Geneva; Histoire de la Confréderation
Suisse, par Jean de Müller. R. G. Blochse, et J. J.
Hottinier, traduzo de l'Allemand, et continué jusqu'à nos
jours, has been published at Berne. A P cupidous
History of Switzerland, by A. Vieuxaveus, has
been published by the Society for the Diffusion of Useful
Knowledge, s.w., 1846, with ample references to the
original sources.

SWORD-FISH. [Xiphias.]

SWORDS. Greek Swords. The earliest and fullest
information on the subject of the Greek swords is in
the poems of Homer. With him the θησος, or, and γέμισσαν
and γέμισσασ,spear -like point. The hilt is a large knife sus-
pended near the θησος (IL, iii. 271) for the purpose of cutting
anything; the θησος is called μελαινοσ, a term not very
satisfactorily explained, and διπρόφσης, or studded with
silver, an epithet relating probably to the handle (σέγων),
which, a belt, generally of oil; the scabbard, scollo, in
writers called θησος (Od. viii. 404), is covered with ivy.

At a later period coins, vases, and other ancient
monuments, exhibit the form of the Greek sword, which was a
short cut-and-thrust blade, diminishing gradually from hilt
to point. Its length was as a rule rather over 14 inches. It is very clearly shown
on a silver coin of the Locri Opunti, where a Greek warrior
is represented fighting. [Locrius.]

Varieties in the form of the blade and handle are occasion-
ally to be met with on vases. (Müllin, Vases Antiques, p.
161; Millin, Sheffield, and Sheffield, and Millin, Polyb. iii. 114.)

The Greek sword was worn on the left side, suspended
by a belt from the shoulder, as in the figure of Melaeon on the coins of Athens, but occasionally by a girdle
round the waist. (Millin, Vases Intides, xxviii.) On a vase in Millenig (pl. 23) it is slung more forward, so that
the hilt is in the middle of the breast. The material of the Greek swords were plated with bronze,

Roman Swords. — The Roman sword was called 'ęnsis,'
'gladius,' and 'muro,' (though 'muro' originally meant the
point of the sword only; its edge, 'acies,' its handle,
'capulis,' its scabbard, 'scabbis.' The breastplate of the Roman sword used in his day, which
had the Iberian short cut-and-thrust blade of finely tempered
steel: this had been substituted for the old Roman sword at
the time of the war with Hannibal (ib. vi.; also
Proges, xiv., where he speaks of the admirable temper of the
Celtiberian blades). The form of the sword continued from
this time till that of the later emperors apparently un-
changed. Montfaucou (Antiquités, vii.) states that the
blades of those on the column of Marcus Aurelius and the
arch of Septimius Severus, and the sword of Trajan, and that they became shorter in the time of Con-
stantine the Great and Theodosius. Stewecough (Comment.
in Vegetum, p. 64, Vesal, 1670) speaks of a larger kind of
sword, 'spatha,' under the later emperors. There seems to be
no difference in the shape of the blade used by the
infantry and cavalry on Trajan's column and other similar
monuments. The Roman sword was worn on the right
side. Montfaucou notices three exceptions to this general
practices on the arch of Septimus Severus; and the
spatha is already mentioned to be worn on the left side.
The parasceue appears to have been the insignia or sword
of office of a military tribe. (Martial, xiv. 29; Raderus,
Comment in loc.; and Plut., Lexicon Antic. Roman.)

Other Antient swords and scabbards, see Wilkinson's 'Antient Egyptians;' for the
derivatio, or Persian sword, and that of other Eastern peoples,
Leake, 'Athens,' ii., pp. 22-5-6, new ed.; the sculptures
at Persepolis, engraved in Sir R. Porter's 'Travels,' and
for the swords of the Gauls, Livy, xxv. 46; and more fully,
Diodorus, v. 30.

In the British Museum are four antient bronze swords,
three of which have cut-and-thrust blades, varying in length
from 10 to 25 inches, and in breadth from 1½ to 3 inches.
Another, which was purchased at the sale of the late
bishop of Lieflah's antiquities, and considered to be Etrus-
can, is bound with silver wire round the handle, and is about
13 inches long. In Montfaucou (Antic. vii.) are engravings
of three, two of which, as he states, measured a foot
and a half (French), and the other 30 inches in length. In
the Museo Borbonico, vol. v., pl. xxxix, is an engraving of one
having two rings, which are engraved on both sides, with plates of metal, and studded with brass: a handle
of another is finished with an eagle's beak. (See the desc-
cription of the plate, where a passage from Heliodorus, Athi-
opolis, lib. ii. 11, is quoted in illustration.)

Two others are engraved in the same work, iv. 44, one
of which has a handle full of holes to receive studs (θῆξια).
Compare Virgil's 'Stellatus lispide Fulva,' iv. 26.

Varieties, such as the harpa or the sword of the Amazonas
(Millenig, Vases Antiques, i.) are mythology, and a de-
scription of them has consequently no place in an historical
account of the sword.

SWORDS, MANUFACTURE OF. So little is known
respecting the early history of the manufacture of arms in
England, that the following may be of interest. The two
great seats of the British hardware manufacture, Bir-
mingham and Sheffield, have been compelled to rest upon
mere conjecture respecting it. Hunter states that we have
no direct information respecting the manufacture of arms at
these two towns: yet he adds that circumstances point to the
necessities for the government of the cutlers of Hallamshire,
and in the later acts of incorporation, are instruments of
peace; yet he considers it probable that weapons of offence
were made there at an early period. The later acts of incor-
norance, show that Sheffield cutlers dealt in swords, and
other articles of steel. Holland, in the work referred to
at the end of this article, gives a representation of two men
grinding a sword-blade, copied from a MS. palster, written
about the time of King Stephen, which is preserved in the
library of Trinity College, Cambridge, and which probably
represents the usual construction of grinding machinery at
that time. The grindstone is mounted upon a horizontal
axis, which one man turns by means of a crank, and the
sword, which is straight and pointed, is pressed down upon
its periphery by the other, who sits on a beam above
the level of the stone, so that his weight may be conve-
niently thrown upon the sword, to press it firmly against the
stone. The same author observes that it appears, from old
drawings, that in those early times blades of steel were
studded, or polished, polished, by hand, instead of having that operation per-
formed, as at present, upon a wheel covered with leather
and emery.

But while there can be no doubt of the extensive manu-
facture of swords in England at an early period, the blades
made in Spain and Italy, and more especially those brought
from the East, bore the pre-eminence. The swords of To-
ledo, which are still celebrated, were sought after on account
of their admirable temper, in the time of the Moors, and
even under the Romans. It has been supposed that they
are indebted for their valuable qualities to some peculiar
property in the water of the Tagus, which is used in tem-
ping them; and the author of 'A Year in Spain,' cited by
Holland, corroborates this supposition. But there is another
point which it is necessary to consider. In the early period of the French invasion, the manufac-
tory was removed to Seville, where the national junta then was,
but it was found that the swords manufactured on the
guards of the Guadalquivir were very inferior to those of
the earlier period. A correspondent of the Queen of
Coburg. In the time of the crusades, and down to a much later period, Milan
supplied swords of excellent quality in large numbers; but
celebrated as these and the Spanish blades deservedly were,
they were not so fine as the Toledo swords. The most
=ous sums were often given for them. These Oriental
'sabres,' observes Mr. Holland, 'which are invariably re-
garded by their possessors as being of great antiquity, are
presumed to have been made at Damascus in Syria, Isaban-
, in Persia, or Ctesiphon, in Armenia; but it is not
likely that any credit recent visitors, is the manufacture
of articles carried on at present.' But see Damas-

vii., p. 296.) He proceeds to say, 'Of all the sa-
ever, the fame of which has reached this country, those of Damascus are by far the most noted, most persons having heard of them, though very few indeed have seen them, and fewer still have been the instances in which the blades themselves have confirmed those strange stories about their temper which has been made of them. These latter parts, to be sure, are known but little of the nature of steel.

The characteristics ascribed to the real Damascus blades are, extraordinary keenness of edge, great flexibility of substance, a singular grain and flakelessness of surface. They would frequently be cut up by a particular flake being given out by any friction of the blade, either by bending or otherwise.

This writer conceives that their quality, undoubtedly excellent as it must be, has been greatly exaggerated, and that the extraordinary power of the Damascus blades is not in a great measure, dependent upon the strength and dexterity of the user. A gentleman who purchased one of these sabres in the East Indies for a thousand piastres, informed Mr. Holland that, although it was very flexible, and bore a fine keen edge, it could not be safely bent to more than 45° from a straight line, and it was not nearly so sharp as a razor; yet, when wielded by a skilful hand, it would cut through a thick roll of sail-cloth without apparent difficulty; far less would a single stroke of the ordinary sword, nor by the (Damascus) sabre itself, in an ordinary hand, though the swordsman who tried it could, it appears, do nearly the same thing with a good European blade.

About the year 1669 an attempt was made to improve and extend the sword manufacture of England by the incorporation of a company of sword-cutters for making hollow sword-blades in Cumberland and the adjacent counties. The new company was empowered to make swords, to erect mills, and to employ a great number of German artificers; yet the project failed. Anderson (Hist. of Commerce, vol. ii., p. 387) states that the first patentees assigned their rights to a company of merchants in London, who, apparently to prevent the premium to be paid to the original objector, purchased the several forfeited estates in Ireland to the value of 20,000l. per annum. These were subsequently sold off, and the corporation was broken up.

Casting, apprenticing, to the parsimony of the manufacturers, who led them to use inferior materials, and to employ unskilful workmen, English sword-blades fell into very ill repute during the eighteenth century; so much so, indeed, that an English officer would not trust his life to the hazard of the probable failure of a sword of native manufacture. In 1783 the sword-sellers of London, in consequence of the very bad quality of English blades, petitioned the lords of the treasury for permission to import German swords free of duty; and this circumstance, by attracting public attention to the low state of the British cutlery, led to very important improvements. A full account of the proceedings is given in Gill's 'Technological Repository,' in a paper entitled 'Recollections of the late Thomas Gill,' by his son, the editor of that work. From this we find that Lord Suryer (afterwards the fourteenth duke of Norfolk) wrote to Mr. Eyre of Sheffield, on the 1st of October, 1838, informing him of the petition alluded to, and requesting such information from any Sheffield manufacturer as would enable him to remove the disgraceful imputation thrown by it upon English ingenuity. Mr. Eyre communicated an extract of the letter to the late Mr. Gill, of Birmingham, and he, in the month of December following, memorialized the lords of the treasury, stating that he could manufacture a sword which had been tried in battle by several of these swords were made, a comparative trial was appointed, and every sword sent in was submitted to a machine recommended by Matthew Boulton of Soho, in which the temper was gently heated and strained, to reduce its length from thirty-six inches to twenty-nine inches and a half. The result was that 2650 of Mr. Gill's swords bore the test, and only 4 were rejected, while the German swords 1400 were received and 28 rejected; the proportion of defects of the English manufacturers being 13 to 1, as compared with those of Mr. Gill. The extremely low state of the British sword-manufacturer at that time is sufficiently testified by the fact that of the blades sent by other English cutlers, 7700 were received and 1084 rejected, the proportion being rather more than two bad to five good blades. In addition to the above-mentioned test, Mr. Gill tried his swords by striking them flatly upon a single barrel, and edgeways upon a cylinder of wrought-iron, sometimes a piece of a gun-barrel, which they often cut through. They were still so tough, although formed of cast-steel, that, after cutting a gun-nipple or a small piece of the edge of a horse-shoe, they would frequently cut through the hilt, after which it would recover its original straightness, excepting at the point. So completely did he establish the fame of his swords, that even German officers applied to him for them; nor was his attention devoted solely to swords; for the excellence of the temper attributed to improvements in the ornamentation of swords by blueing, gilding, and embossing.

The process of manufacturing swords at Birmingham has been described by Holland, from whose work the following particulars are derived. The material of which the blades wrought should be cast steel of the very best quality, and wrought with the greatest care. Of this material, besides the quantity prepared at Birmingham, much is obtained from Sheffield, in the forms of bars, called sword-noodles. These are heated in a forge to a very red heat, and drawn out upon an anvil by two workmen with hammers, giving alternate strokes. When the blade is required to be concave upon the sides, or to have a rounded back, or some similar ornament, it is afterwards cut between square edges, a process by which the blade is then hardened by heating it in the fire until it becomes warm-red, and dipping it, point downwards, in a tub of cold water. It is tempered by drawing it through the fire several times until the surface exhibits a bluish tint; and, at the same time, if there be any flaw in the blade, its character is changed, and the metal black. The temper is next annealed; this is done by the action of the temper, which is placed in a flat iron box, and covered with a cover of earth, and kept a certain time at a determined heat, which is regulated by a thermometer. The temper is next tried, by striking the blade smartly upon a table on both sides, and by severe strokes with the back and edge upon a block. Mr. Inglis, in his 'Spain in 1830,' vol. i., p. 396, describes the trials to which sword-blades are subjected at the celebrated manufactories of Bilbao and Logrono.

The temper is then heated to a certain degree, a hot wall, and so bent into an arc forming at least three parts of a circle, and then struck edgeways upon a leaden tablet with all the force which can be given by a powerful man holding it with both hands. The polishing, according to the several authorities, of a manufactured sword is said to consist of attaining the desired object. The first, which is stated to be still pursued by some French cutlers, consists in scoop-
It is possible that we read about the efficiency of the Sybarite s online only to the ruling aristocracy. The government appears to have always been in the hands of the aristocracy, which, as the words of Aristotle seem to suggest, consisted of the Sybarites, while the Agiand no numbers far exceed the Tyrrenian, formed the commonalty. These two parties were engaged in a continual struggle, which at last, when it broke out in a civil war, led to the absolute destruction of the city, which seems to have been precipitated successfully in Austria and Prussia.

Another way of explaining the varied appearance of Damascus blades is that of M. Brant, examiner-general of the asays at the royal mint in Paris, whose experiments and observations are preserved in "De l'oriflamme," published in the Etablir du Service Journal, vol. 1810, p. 174. According to his method, a bar of malleable steel, of about an inch and a half in breadth and an eighth of an inch in thickness, is to be bound round with iron-wire, at intervals of one-third of an inch. The iron and steel are then to be incorporated by welding, and repeated additions of iron-wire are to be applied and incorporated in the same way. The compound bar thus formed is then stretched and divided into shorter lengths, the bars being subjected to repeated hammering, forming ground, and tempered. By filing semicircular grooves into both sides of the blade, and again subjecting it to the hammer, a beautiful damasked appearance is produced; and the figure on water is rendered visible by washing the blades with a menstruum of aquafortis and vinegar, in order to corrode the surface slightly. According to the account referred to, the swords made in this way are of extraordinary tenacity, and are not very much more expensive than those in Damascus, which have been produced in Austria and Prussia.

Besides the numerous contrivances for producing the varied appearance of Damascus blades, ingenious processes are resorted to for ornamenting sword-blades by etching and damasked combinations. These processes are described in Ure's "Glass and Steel," and Dr. Ure than they can be in this place. He supposes that the oriental damask is not a mixture of steel and iron, but simply cast-steel charged with a superabundance of carbon; so that, by slow cooling, two distinct layers or leaves are formed, the first being simply steel, and the second a mixture of steel with the excess of carbon, forming a carburized steel or cast-iron. These two compounds form a kind of crystallized surface, which, when washing with acidiulated water, assumes a damasked appearance; the parts consisting of pure steel becoming black, while the carburized steel remains white.

(Holland's "Treatise on Manufactures in Metal," London, 1774, p. 14.)
SYDNEY, a capital of New South Wales, is on the east coast of Australia, in the county of Cumberland: the town is situated on the south side of the beautiful bay called Port Jackson, in 33° 55' S. lat. and 151° 54' E. long. The east coast of Australia, north and south of the entrance to Port Jackson, consists of sandstone cliffs rising precipitously from the water's edge to the height of 200 or 300 feet. On approaching the coast from the east, the
line of perpendicular cliffs appears to be continuous; but, on coming nearer, an opening is perceived between two lofty headlands, through which the Bay of Sydney enters the North Head. Within these headlands, a point of land called Middle Head stretches out from the south side of the bay in such a manner as to protect it completely from the easterly winds and the swell of the Pacific. After passing round Middle Head, the view extends in a westerly direction about fifteen miles from the coast, the width varying from about a mile to three miles, with excellent anchorage for the largest vessels. This is Port Jackson, and is known as Sydney Cove. Along the north and south shores of Port Jackson there are numerous coves, or inlets, and there are several islands in it. The north shore is rather high, very rocky, and thickly covered with a dark and stunted vegetation; houses are seen seated on the margin of each, with a bold and dant inclination. The south shore offers more pleasing scenery, cottages on the sandy beach behind South Head, promontories crowned with handsome mansions, surrounded by groves and lawns: on approaching Sydney numerous buildings are seen, inhabited by the civil officers of the colony; the government-house, several windmills on the high ridges near the town, and forts and batteries, completed or in progress, are conspicuous objects. Port Jackson at the entrance is about a mile wide, but narrows to about two miles, and then to about three miles. At Sydney the width is a mile and a half. There is a lighthouse on South Head, called Macquarie Tower, which is visible thirty miles at sea; and not far from it is a signal-station, whence telegraphic communications are kept up with Port Jackson. The Sydney of the approach of vessels towards the coast. Fifteen miles inland, at the head of the bay there is a creek, seven or eight miles long, and navigable for boats of 12 or 15 tons burthen. At the head of this creek is the town of Parramatta, and the creek itself is called Parramatta River, from a small but constant stream which flows into it.

Sydney is about seven miles from South Head, on the south shore, and is built partly on the west side of Sydney Cove, but chiefly on the low ground between rocky promontories, which are studded by three inlets, Love Cove, Sydney Cove, and Darling Harbour, or Cockle Bay. Previous to the arrival of Governor Macquarie in 1810, Sydney was little better than an irregular village of houses, cottages, and bark-covered huts, built by each proprietor in such a situation and in such a manner as suited his convenience. Macquarie however laid down a plan for the construction of the town, according to which the greater part of it is now built; the principal streets run inland to the south, and are connected by an extensive plan of the production of the coast. Sydney lies at the south-west of the shore of Darling Harbour. The Government House and Government Domain limit the extension of the town to the east and north-east: it extends to the south, from Dawes's Battery to the burial-ground, nearly three miles. Sydney Harbour only a shelf of water; and there are two forts at the entrance, Macquarie Fort at the point of the east promontory, and Dawes's Battery on the ridge of the west promontory. Darling Harbour is much more extensive than Sydney Cove, running inland to the south some distance beyond the town. A finer situation for a large mercantile city can hardly be imagined. The water is deep, the shores are precipitous, and the wharfs so situated that cargoes can be hoisted from the holds of the largest ships up to the floors of the warehouses.

The houses in the principal streets are generally two stories high, but many are three; some are built of brick, some of sandstone, and some are of wood. Many of the shops are fitted up with plate-glass windows, chandeliers, and other fittings, at the most costly English and French styles of Paris. The side-pavements for foot-passengers are made with small stones, not with flags, but asphalt has been introduced, and is extending.

There are no capacious buildings in Sydney which particularly merit notice for their architecture. The Government House is beautifully situated on the east side of Sydney Cove: the building has become large by additions, but is of the plainest and simplest kind. The Commissariat Store is an ornament to the town, the largest and most abundant, and may discharge their cargoes. The Military Hospital stands conspicuously on the summit of the high ground between Sydney Cove and Darling Harbour. St. Philip's church, built in 1796, is the oldest in the town. St. James's church is a large but plain brick building, with a lofty and rather handsome spire. St. Andrew's church was building at the latter end of 1841, and is probably now completed. The Roman Catholic Cathedral is a fine building of hewn stone, and the most handsome structure in Sydney. The Scotch church is a plain building of freestone, with a square belfry tower. The Independent chapel is also plain, but commodious. The Court House is a large brick building. The Custom-house is of extensive building.

The market-place consists of four oblong buildings, and is a very convenient structure. Besides this market, which is towards the centre of the town, there is a corn-market and a cattle-market at the south end of the town. All the markets are abundantly supplied. The Royal Victoria Theatre, built in 1840-41, is about the size of the English Opera-house in London.

The population of Sydney, according to the census of June, 1853, was 16,232; building of 9613 males, of whom 2455 were convicts and 7158 free men; the females 9077, of whom 6641 free women and 2436 convicts. At the beginning of January, 1838, the population had risen to 20,000. The latest census, which we extract from the New Zealand Journal of November 13, 1841, of the following:

<table>
<thead>
<tr>
<th>Population</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born in the colony</td>
<td>7,090</td>
</tr>
<tr>
<td>Arrived free</td>
<td>17,332</td>
</tr>
<tr>
<td>Others free</td>
<td>3,356</td>
</tr>
<tr>
<td>Ticket-of-leave holders</td>
<td>207</td>
</tr>
<tr>
<td>Convicts in government employ</td>
<td>1,018</td>
</tr>
<tr>
<td>Convicts in private service</td>
<td>1,060</td>
</tr>
</tbody>
</table>

From January 1, 1841, to November 30, 1841, there were introduced into New South Wales 16,612 emigrants by government aid. They were taken out in 59 ships of the largest class, from 450 to 1000 tons burthen; of these, 85 landed their passengers at Sydney, and 34 at Port Philip. In addition to these bounty-emigrants, there were about 2000 others who had no aid, making an addition to the population of New South Wales in eleven months of 19,000. The sum expended by the colonial government in the introduction of these emigrants was about $500,000. In 1833 the number of houses in Sydney was 1800; in October, 1841, the number was 4593, of which 3457 were of stone or brick, and 1136 of wood. Of these houses 102 were inhabited, and 4477 uninhabited. There were an average of 2.77 inhabitants to a house, or a family of 5 persons. The average number of inhabitants to a house was rather more than 5. Thus in the eight years from 1833 to 1841 the increase of the population of Sydney was 13,741, and the increase in the number of houses in the same period was 2793.

Building-round in the principal streets of Sydney is enormously dear. House-rent is also exceedingly high.

In 1839 the commerce of Sydney employed 50,000 tons of British shipping, navigated by 3000 seamen; and there were 150 vessels belonging to Sydney, worth $360,000.

In 1839 the mills at Sydney for grinding and dressing grain amounted to 17, namely, 4 worked by steam, 3 by water, 1 by horse-power, and 9 windmills. There were 2 distilleries and 8 breweries. Of manufactories there were 3 soap and candle-makers, 1 hat, 7 coarse woollen 1 tobacco and snuff, 1 rope, 4 coach, 2 starch, 5 tanneries, and 3 saw-mills. At Canterbury, 44 miles from Sydney, a large manufactury for the refining of sugar was erected in 1841, and is probably now finished. It is calculated to refine ten tons of sugar per day. The population of the town and of the two large steam-boilers holds 9000 gallons of water.

The wages of mechanics average from 5s. to 8s. a day; and all trades required in house building and furnishing are in great and constant demand. Exemplary prices: beef and mutton, according to the season, from 4d. to 6d. per lb.; pork, 9d.; veal, 16d.; 2-lb. wheaten loaf, 4d.; butter, 2s. 3d. per lb.; potatoes, 2d. per lb. or 14s. per cwt.; maize, 3s.; bushel, wheat, 9s.; English barley, 7s. 6d.; flour, 2d.; eggs, 1s. 6d. per dozen; fowls, 6s. a coum.
Arbur coal, 16a, a ton. Fish is chiefly brought from Botany Bay overlaid in carts, a distance of seven miles.

The first year of the Society of Astronomers was 1763, the liabilities 342,444l.; Commercial Bank, assets 536,599l., liabilities 271,904l.; Union Bank, assets 57,491l., liabilities 216,779l.; Sydney Banking Company, assets 16,575l., liabilities 5,901l.; New South Wales Bank, assets 462,536l., liabilities 255,003l.; Bank of Australia, assets 415,047l., liabilities 180,345l. The liabilities of these banks consist of notes in circulation, bills, and cash deposited; the assets, of bullion, coin, &c. There is also a saving bank, which in 1841 was set up. A loan of 25,000l. was established in 1840, which, in the year ending August, 1841, had insured property to the amount of 760,725l., the premium received having been 5244l.

Sydney is the greatemporium of the trade for Australia and the Pacific Islands. There are eight newspapers published in the town: one, the Sydney Herald, daily; the rest are mostly thrice and twice a week. The Colonial Society, for concentrating information on colonial subjects, had, in November, 1841, 807 members; the receipts for 1840 were 236l., the expenditure 190l. There is a flourishing Mechanics' Institute called the School of Arts.

Of scholastic institutions there are the Sydney College, with about 120 scholars, and the Australian College, with about 100 scholars. The Oxford University of New South Wales was founded by act of the New South Wales Parliament in 1833, by means of a loan of 3500l. from the colonial government, but only 1890l. of the subscription money had been paid up in October, 1841. In 1833 there were in Sydney six new schools, together with other schools educated on the Modern system, and there was a female school of industry supported by voluntary contributions, with 22 scholars.

Steam-boats ply between Sydney and Hunter's River; and there are boats leave Sydney every Sunday morning for Parramatta.

Sydney, being the seat of the colonial government of Eastern Australia, is the residence of the governor, and here the legislative council holds its sittings. It is also the seat of the supreme court of justice and of the police court.

The distance of Sydney from Plymouth by the Cape of Good Hope is about 13,000 miles.

In 1817 the British government had determined to form an establishment in Australia, in order to empty the gaols and houses of correction; to transplant the criminals to a place where, by labour, with moral and religious instruction, their conduct may be reformed; to afford at the same time an asylum for such of the noblemen and gentlemen, who, from preference to health, relief and future benefit to the mother-country. With these objects in view Captain Arthur Phillip, of the royal navy, sailed from Portsmouth, May 13, 1787, with 11 ships, intending to settle the colony at Botany Bay, where he arrived on the 18th of September. The bay was found to be no means an eligible harbour, being open to the easterly winds, which whenever they blow violently roll in a heavy sea from the Pacific; besides that the land which Sir Joseph Banks had represented as a series of beautiful meadows was found to be nothing but swamps and sand.

Captain Phillip sailed immediately in search of a more suitable place of settlement, and fixed in a few days on the locality of the shores of Sydney Cove in the bay of Port Jackson. Port Jackson is said to have derived its name from a sailor of the name of Jackson who first discovered the entrance between the two headlands, and the name of Sydney is stated to have been given to the new town in honour of Lord Sydney, who was a lord of the admiralty (some say the secretary of state) at the time when Captain Phillip settled the colony on its present site.

(Lang's History of New South Wales; Jameson's New Zealand, South Australia, and New South Wales, 1843; Wetherill's Narrative of New South Wales; Brem's Excursions in New South Wales; Sydney Herald, up to December 23, 1841, &c.)

SYENE [Egypt].

SYBURG (Latinized SYLBIERIUS), FREDERICIUS, was a prelate of the village of Wetter, near Marburg, whence he generally calls himself Fredericus Sylbiurgius Veterensis. His father was a farmer in middling circumstances; but the son received a good education, and during the time he spent at the university of Jena, he chiefly devoted himself to the study of Greek under Rhodemannus. After the completion of his academic course, he had the management of several public schools, first that of Lieth, in the county of Solms, and then that of Hochheim near Wurzbach. He is of a mind devoted to the business of teaching, and his occupation took up all the time which he wished to devote to literary labours. Accordingly he gave up his post, and entered into a connection with the printer Andrew Wechel, of Frankfurt. Son of the last-published book, Syburg undertook to edit Greek works. He continued at Frankfort until 1591, when he went to Heidelberg, and formed a similar connection with the printer Hieronymus Commelin. In both places Syburg, who had the supervision of the press entrusted to him, spent the remainder of his life in the preparation of them, performed these duties with the utmost accuracy, and showed an extraordinary critical talent in the notes which accompanied almost all his editions. He thus had the satisfaction of seeing his efforts sufficiently rewarded him with an annual pension from the funds of the university of Marburg. Further particulars of his life are not known. He died at Heidelberg, on the 16th of February, 1596, as is stated on his tomb-stone, which still exists in Heidelberg.

Syburg was one of the most eminent and most industrious Greek scholars of the sixteenth century, and the greatest men of the age, such as Casaubon and De Thou, entertained a profound admiration for him. He was a modern editor of Greek works, and the first editor of the Greek language contains many articles by Syburg. The editions of Greek writers by Syburg are still very valuable, and in critical accuracy they are not inferior to those of Stephanus, Rhodemannus, and the other great critical editors. Some of his editions have never yet been excelled. His first publications were new editions of some elementary Greek grammars which were then generally used. In 1533 he published, at Frankfort, in one volume, folio, his edition of the works of Dionysius of Halicarnassus, with notes by himself, and an improved reprint of the Latin translation by Romulus Amausaeus. It also contains a dissertation by Syburg, 'De Grammaticis Pausiani Anomalis,' the whole was reprinted in 1613. Between 1584 and 1587 he published at Frankfort, in a collection, the works of Philo of Byblos and his notes, in a collected version. This edition only contains the Greek text with the various readings, and is still the best and most correct edition of all Aristotle's works. In 1585 he edited four different editions of Isocrates (ad Demonicum, ad Nicocleum, Nicocleum contra Sophistam), Frankfurt, in 8vo. The year following there appeared by him the first complete edition of the works of Dionysius of Halicarnassus, Frankfort, 2 vols. folio. It contains the improved Latin translation of the Roman Antiquities by Gelenianus, and the notes by himself. This edition has never yet been surpassed: it was reprinted, yet very incorrectly, at Leipzig, 1691, 2 vols. folio. From 1588 to 1590, he published, at Frankfort, in 3 vols. folio, the valuable collection of ancient writers on the history of Greece, 'Pseievia Legum, vita antiquae artiumque inventoria Graecae,' to which he added introductory notes and notis. Vol. I contains 'Sib. Capt. Messala Corn. L. Florus, Velleius Paterculus, S. Aurelius Victor, S. Rufus, Eutropius, Cassiodorus, Jornandes, and Julius Exuperantis.' Vol. ii. contains the 'Scriptores Graeci Minores Historiae Romanae, that is, the Fasti Consularis (Greek and Latin), Paeanios, Xiphilinus, Herodian, Zonius, Julian's Cæsars, Olympiodorus, and extracts from Suidas. In 1590 he published, at Frankfurt, in 4to, the four works of the Roman historian Apianus, 'De scriptione Italicorum,' and 'Rerum Asiae Moribus,' the last work that he published in the establishment of Wechel was a collection of some Greek epic poems, 'Epieia Elegiacaque Minorum Poetarum Grecorum, Graecum et Latinum,' Frankfort, 1591, 8vo. A second and much larger collection contained notes and notis, and formed the year of Syburg's death. All the subsequent editions of Syburg were published in the printing establishment of Commelin at Heidelberg. In 1592 he edited, in 1 vol. quarto, the life of Paul of Tarsus, by Andreas Cretensis, in Latin and Greek; and in the same year he published the edict proince of the Greek text of the work of Theodoretus, entitled 'Remedia contra Morbos Graecos,' with the Latin translation of Zenobius Aenajudji, and notes by himself. In 1592 he also edited the complete works of Clemens of Alexandria, with notes, folio; and in 1594, in
SYLVIFELLEN [SWEDEN].
SYLHET. [Sylhet.]
SYLLA. [Sylla.]
SYLLOGISM (συλλογισμός). A syllable consists of one or more elementary sounds of a language uttered in one emission of voice. The pronoun I is an example of a syllable consisting of but one element only; and the syllable strange is an example consisting of several elementary sounds articulated (joined) together. Words which consist of one syllable are termed monosyllabic; those consisting of two are termed disyllabic; those of three, trisyllabic; and so of more than three are indefinitely termed polysyllabic.

Spoken language is a system of audible signs for the expression of thought, and written language is a system of signs to express spoken language, so that a language is the sum of the spoken and the written. Syllables, both as words and as parts of words, belong both to spoken and written language.

In a pronounced syllable two distinct things are observable: viz., 1st, its elementary structure; and, 2nd, the musical properties of the voice. Of these, the first is the sum of sounds which are described under the general terms pitch, loudness, and quality. Thus in the pronoun I we observe the elementary structure to be that of the diphthongal vowel ï as heard in the word ride [stræm]. And we observe also whether this vowel is said or sung, that is, whether the condition of voice belongs to speech or to song; an accurate observer also perceives the precise degree of pitch and loudness and the character of the quality of voice.

The time which a syllable occupies in pronunciation is termed its quantity. In sonority and isocoelely it is impossible to determine the quantities of syllables are extended beyond their ordinary length; while in rapid colloquy they are somewhat shortened. The ordinary quantity of a syllable, when neither extended nor shortened, is termed its neutral quantity or its constituent elementary sounds: thus the quantity of the syllable mine is the sum total of the quantities of its elementary sounds n, i, of, and e.

It would occupy much space to describe the operations of time in connection with the quantities of syllables. Those causes are, the singleness of the vocal emission, and the elementary structure of the syllable. The elementary sounds and their chief modes of succession in English syllables are described in the article Stemma.

Syllables are of various lengths, from an extremely short to a very long quantity, as in the examples it, hot, out, long, length, strength, which form an increasing series.

In words of more than one syllable, one of them is always marked as the accented, or the primary, syllable, by what is termed stress or accent. Stress is produced either by an abrupt percussion of voice, as in the word pepper, or by an extended quantity on a swelling loudness of voice, as in the word anætre. The stressed syllable of a word is invariably that which receives the modification of voice expressive of sense and feeling, called emphasis.

The metrical arrangement of language depends on the quantity and stress of syllables [Prosody], both of which are inherent; while the pitch, loudness, and quality of voice, which the syllables are uttered as accidental, and belong to the thought and feeling of the speaker. [Elocution.]

Promodians commonly classify syllables into long, short, and common. Mr. Herries examines their elemental relation to their capacity for extension, which is an important practical consideration. * His remarks may be


generalized by stating that when syllables end with extensible elements, they admit of greater extension throughout, than those syllables which are terminated by inextensible elements.

The late Mr. Thewfall carried this inquiry farther by considering the structure of syllables in relation to the smoothness, harshness, vivacity, &c. of the sound of language, and that not in a vain effort but simply to bring them in harmony. His illustrations were taken from Shakspere, Milton, and Dryden. To enter upon this subject would occupy more space than can be allowed it in a work of this nature.

Dividing words into syllables is a different operation according to the object in view, thus: 1. When a word is pronounced in widely separated syllables, to enable a child to appreciate each, as in uttering the word provided, thus, pro-or-ided, by which means a child readily apprehends each successive syllable of the word; 2. When words are analyzed into their component parts, in order to exhibit its etymology, and thus lead to a clear apprehension of its signification, as a whole from knowing that of its parts, as in dividing the word thermometer, thus, ther-mo-mer-ther, 3. To divide a word into its syllables, to enable another to write it with correctness, as the word barometer, thus, bar-o-me-ter.

The correct use of the alphabet in writing words is termed orthography, and is an important part of grammar. [Cyrilography.]

The division of written words into syllables is an attempt to exhibit the audible syllables to the eye, and is attended with many difficulties, as the varied divisions in the several dictionaries manifest. Those who seek further information may consult with advantage the principles of those prefixed to Walker's * Pronouncing Dictionary; Herrie's * Elements of Speech; Thewfall's * Essay introductory to his Illustrations of English Rhythmus; Roe's * Elements of Rhythm; and Chapman's * Music and Melody of the English language.

SYLLIS, Savangi's name for a genus of Dorsibranchiate Annelid, which have tentacles unequal in number, and articulated in chaplets, as well as the upper cirri of their body, which are very simple and have only one packet of bristles (soes).

Example, Sylis monilarius. [Annelida; Dorsibranchia.]

SYLLOGISM (συλλογισμος). The object and character of logic are explained under the word Organon; the present article is devoted to the formal part of the science, which consists entirely in the treatment of the syllogism, and the reduction of fallacy to rules of detection. Every sentence in logic is considered as consisting of a number of terms, and each term as modified by its connections, to form a number of propositions. Thus an assertion consists of a premise and another and a final assertion, is either a syllogism, a collection of syllogisms, or a mass of words without meaning: and when we separate the constituent assertions, and write them in their forms of logic, we are not thereby the less reasoning to conclude the correctness of the premises or, as many fancy, dealing with a new species of rationalization. All that is called reasoning, and which cannot be made syllogistic, is obscure: for the syllogism is the simple form in which the act of reasoning is an act of intuition.

Aristotle defines syllogism thus: * Syllogism is speech or language in which certain things being assumed, something different from them is proceeded from the assumptions; and, by virtue of the assumption, I mean it results through the assumption; and, by through the assumption, I mean that no external term is required in order to there being a necessary result. (Analyt. Prior., i. 1.)

* So easy indeed is the deduction, when the premises are properly disposed as preparatory to a syllogism, that many persons doubt the utility of the syllogism altogether. With these we are not now arguing: we shall only observe that he must be fortunate who comprehends the clearest mode, is never obliged to have recourse to it to destroy ambiguity or heighten evidence; and particularly so in his opponents, who, in verbal or written controversy, never finds it necessary to employ it in trying their arguments. This is the subject of the next section, and the weapon of last resort in dispute: and a bad syllogism, with one of the premises implied only, and not expressed, is the first resource of fallacy; which last sometimes even allowed to remain unrefuted, by neglige
placing it in a logical form. To bring forward the suppressed premises is a visible destruction of every argument; which is logically bad, and in instances that the following is a letter from Cardan to Tartales: "Neither am I moved with envy, for if you are either equal to, or less than myself, I have no cause for it; and, if you be greater in this art, I ought to endeavor to equal you, and not to speak evil of you."

This is meant for reasoning, and there are two syllogisms with suppressed premises, or rather two sorts (a term presently explained), with a suppressed premise in each. In one case Cardan assumes that he does not envy Tartales because he needs not to be equal to him; in the other case he does not believe he ought to do otherwise: if he meant to assume and assert that he never did anything which he had no need to do, and always did everything which he ought to do, his reasoning is logical: but if he would have hesitated to make these assertions, he would have written fallacy. In justice to Cardan's logic however, it is but fair to say that he was not the man to hesitate at either assertion. [CARDAN.]

Every sentence in which the conclusion is a necessary consequence of the premises contained in that same sentence, is a syllogism, provided that the conclusion be obtained from two distinct assertions, and two only. Thus "Some As are Bs, for every B is A," is not a syllogism, though logically true (CONVERSAR). Every assertion may be reduced to the two parts, the affirmative, the universal affirmative, the particular affirmative, and the particular negative. From these, by combination, all syllogisms are derived; and the laws of combination, and the manner of expressing them, constituted that branch of science. It is now often turned into ridicule, particularly as to its notation, and the strange and uncouth words by which the species of syllogisms were denoted. The following letters always signify the several species of propositions:

A, the universal affirmative; every X is Y.
B, the universal negative; no X is Y.
E, the particular affirmative; some X are Y.
O, the particular negative; some X are not Ys.

Since every conclusion must be drawn from the comparison of two things with a third, a syllogism consists of two propositions, in each of which the same term occurs compared with another: this term is called the middle term. Thus in

Every Y is X.
Every Z is Y.

Therefore Every Z is X.

Y, the subject of the first assertion, and the predicate of the second, is the middle term. The two first assertions are the premises, the third is the conclusion. The predicate of the conclusion is called the major term; the subject of the conclusion, the minor term; and the major or minor premise is that which contains the major or minor term of the conclusion. This is the first that is contained first.

The order of the terms in the premises and conclusion must be either

I. A B C

II. C B A

III. B A C

IV. A C B

and these are called the four figures. The three first are in Aristotle, the fourth was by tradition ascribed to Galen, and was called Galenic. In the first figure the middle term is the subject of the major, and the predicate of the minor; in the second, the predicated of both; in the third, the subject of both; in the fourth, the predicate of the minor and the subject of the major. Every particular case of a figure is called a mood; and since either of the premises may be either of the four species of propositions, A, E, I, O, it follows that there are sixteen moods in each figure, or sixty-four possible moods in all. But of these, many are inconclusive, and many moods which admit of conclusion in one figure do not in another. Thus the mood in the example above is AA, and if we apply it in the four figures, we have:—

Every Y is X | Every Y is Y | Every Y is X | Every Y is Y | Every Y is X | Every Y is Y | Every Y is X | Every Y is Z.

The first has a conclusion; every Z is X. The second has none; that is, for anything to the contrary contained in the premises, it may either say every Z is X, no Z is Y, some Zs are Xs, or some Zs are not Xs. It also admits every X is Z, but here Z is the major term, and not X; and it is of the first figure, with the premises transposed, and not of the fourth, the third admits the conclusion; some Xs are Z.

The fourth also admits a conclusion; some Zs are Xs. Consequently the first figure has a syllogism AAA, the third and fourth have AAI.

If all the sixty-four cases be examined, it would be useful exercise to find that the following syllogisms are valid. We arrange them first by figures, then by moods.

First figure; AAA, EAE, AII, EIO.
Second figure; EAE, AEE, EIO, AOO.
Third figure; AAI, IAI, AEO, OAO, EIO.
Fourth figure; AAI, IAI, AEO, OAO, EIO.

The following is the statement by moods:

(1) AAI; Darii, EIO.
(2) IAI; Festino.
(3) AEE; Darapti, Disamis, Datisi, Felapton, Barto.
(4) EIO; Bramantip, Camestres, Dimaris, Fesapo.

Thus the vowels AAA are seen in Barbara, AII in Datisi. The following are instances of each form, with an example which may easily be reduced to the form.

First figure.

Barbara. Every Y is X, every Z is Y, therefore every Z is X. Ex. Those who bribe should not, any more than other law-breakers, be exempt from punishment.

Celarent. No Y is X, every Z is Y, therefore no Z is X. Ex. Those who bribe who, though they have few faults, are capable of proof.

Darii. Every Y is X, some Zs are Ys, therefore some Zs are Xs. Ex. Exploded doctrines are sometimes true, because capable of proof.

Ferio. No Y is X, some Zs are Ys, therefore some Zs are not Xs. Ex. Some of the earlier principles of science are not well appreciated for want of attention to the usual modes of operation of the mind.

Second figure.

Cesare. No Y is X, every Z is Y, therefore no Z is X. Ex. The presence of horses in this species, and their absence in the other, is a complete distinction between the two.

Festino. No X is Y, some Zs are Ys, therefore some Zs are not Xs. Ex. That the mind is only a consequence of the conviction by which the major premise is to be written first, and of the convertibility [CONVERSAR] of the universal negative proposition.

Baroco. Every Y is X, some Zs are not Ys, therefore the last example will do; this mood is only a consequence of the conviction by which the major premise is to be written first, and of the convertibility [CONVERSAR] of the universal negative proposition.

Here, for instance, we express by (1) AAI, that the mood 1A never proves anything but 1, and that only in the third and fourth figures. From the preceding we may collect that—

As to figures: any proposition may be proved in the first; none but negatives in the second; none but particulars in the third; and everything but the universal affirmative in the fourth.

As to moods: from premises both negative or both particular, no conclusion follows: where one premise is negative, the conclusion is negative; and where one premise is particular, the conclusion is particular.

In order to remember the several certain words have been long used by writers on logic, which makes a grotesque appearance; but if the reader will tolerate them till we have gone through an example of each syllogism, he shall see that those who made them were at least as good wits as those who laugh at them. The magic words of the fourth figure are different in various writers; we have taken those used by Dr. Whately.

First figure; Barbara, Celarent, Darii, Ferio.
Second figure; Cesare, Camestres, Festino, Baroco.
Third figure; Darapti, Disamis, Datisi, Felapton, Bardo, Feriso.
Fourth figure; Bramantip, Camestres, Dimaris, Fesapo, Fresison.
some Zs are not Xs. Ex. None but the industrious can succeed, so that there must be many failures.

Third figure.

Darapti.—Every Y is Z, every Y is Z, therefore some Zs are Xs. Ex. Politics and literature are not necessarily compatible, for many persons can be named who have cultivated both.

Disamis.—Some Ys are Xs, every Y is Z, therefore some Zs are Xs. Ex. Many things inexpedient, because wrong, are apparently useful.

Datisi.—Every Y is Z, some Ys are Zs, therefore some Zs are Xs. Ex. The last example will do for this also.

Fesapo.—No Y is Z, every Y is Z, therefore some Zs are not Xs. Ex. There are organized bodies to whose existence air is necessary, and which have no locomotive power, for instance.

Bobardo.—Some Ys are not Zs, every Y is Z, therefore some Zs are not Xs. Ex. Even industry does not always succeed, for men of great research have been mistaken.

Ferio.—No Y is X, some Ys are Zs, therefore some Zs are not Xs. Ex. It is not true that all who gave evidence were present, for A, B, C, &c. were many miles off.

Fourth figure.

Bramantip.—Every Y is Z, every Y is Z, therefore some Zs are Xs. Ex. Among repulsive things are the sciences themselves, for they are difficult.

Camenes.—Every Y is X, no Y is Z, therefore no Z is X. Ex. No perfect being can be man, for all men are subject to decay, the unfailing mark of imperfection. This example is as one of those species of fallacy, in which the middle term is used in different senses, so that there is in fact no middle (or common middle) term. We have seen this argument used somewhere, 'perfect being' meaning 'morally perfect,' and 'imperfection' including physical as well as moral imperfection.

Dimaris.—Some Ys are Xs, every Y is Z, therefore some Zs are Xs. Ex. Some writers who repeat themselves are amusing; for every prolix writer does it, and the most attractive books are always the shortest.

Fesapo.—No Y is X, every Y is Z, therefore some Zs are not Xs. Ex. Some things which are not much written about are not worth learning; not that this circumstance is otherwise an index, except in this manner, that all really useful learning has its opponents, and it is only where there is opposition that much discussion ever takes place. Here is a good instance of the case in which the premises both yield the conclusion, and explain the sense in which it is to be taken: the preceding is no syllogism unless 'writing about the subject' in the conclusion mean writing about not the subject itself, but whether it be useful or not.

Festoon.—No X is Y, some Ys are Zs, therefore some Zs are not Xs. Ex. Some things which are cried up in haste, for they are valueless, and Cames are an instance of an argument which, logically undeniable, may be disputable as to the matter. One of the premises is 'no relic of antiquity is valueless,' which many may be found to deny.

Some other forms have been given, but they are only some of the preceding with the premises transposed, and which therefore do not obey the conventional rule relative to the precedence of the major premises: as, for instance, named Baralipton (AAL the last syllable being only a termination) which we may mention particularly, insomuch as this word has been very often quoted as a specimen of logical terms. It runs as follows:—Every Y is Z, every Y is Z, therefore some Xs are Zs. Transpose the premises, antilogism of the first figure. Of all the four figures the first is the most natural, and every mood of the other three can be reduced to one of the first, in one of the following ways. It will be seen that every name in the last three figures begins with one of the initial letters of the first, and that it is pointed out to which mood of the first figure each is reducible. Thus Cesare, Cameses, and Cameces are those which are reducible to Celarent of the first figure.

The old significant letters of the descritive words are m, o, p, from whatever they occur. By m it is implied that the premises are to be transposed; by s that the premises marked by its preceding vowel is to be converted, whence s follows only 8 and 1 (Conversam); by p that the conversion is to be made in a limited manner, or per accedens (Conversam); and by A that the reduction is made by what is called the reductio ad impossibile, a term which we now explain. It means that the syllogism can be replaced by one in the first figure, which proves, not the truth of the conclusion, but the falsehood of its contradictory. [Contrary and Contradictory:] For example, take the syllogism Baro, or, every X is Y, some Zs are not Ys.

Therefore Some Zs are not Xs.

If the conclusion be denied, it must be by affirming that every Z is X. Let this be so, then we must have the syllogism Barbara as follows:—

Every Z is Y, every Y is Z, therefore every Z is X.

Therefore every Z is X.

But, by hypothesis, some Zs are not Ys, whence this conclusion contradicts one of the admitted premises, or must be false. One, then, of the premises which gives it must be false; but since every X is Y is supposed true, it must be every Z is X, which is false, or Some Zs are not Xs, which is true. This is a specimen of the persevering determination of the older logicians to make everything reducible to the first figure.

It appears then that few words have ever been invented which have really so much meaning as the now despised appellations of syllogisms. For instance, Disamis, every letter is a sentence. D means that the mood of the first figure into which this can be reduced is Darii; I, that the major premise is a particular affirmative proposition; S, that the reduction requires the major premise to be simply converted; A, that the minor premise is a universal affirmative; M, that the reduction requires the transposition of the premises; I, that the conclusion is a particular affirmative; S, that the conclusion must be simply converted. We thus change

\begin{align*}
\text{Disamis.} & \quad \text{Darii.} \\
\text{Some Ys are Xs.} & \quad \text{Every Y is Z,} \\
\text{Every Y is Z.} & \quad \text{into} \\
\text{Some Ys are Xs.} & \quad \text{Some Xs are Zs.}
\end{align*}

A proper mood was one in which one of the premises speaks of a single subject, as in 'All Frenchmen talk French, Pierre is a Frenchman, therefore Pierre talks French.' There was much discussion as to whether such a proposition as 'Pierre is a Frenchman' was a universal affirmative or not, it being obvious on all sides that, whether or not, it would have in deduction all the properties of a universal affirmative.

An enthymeme is a syllogism in which one premise is obviously implied, and is the form in which argument is commonly given. For example, 'He isn't here, I don't see him,' implies that the speaker would affirm himself certain of seeing him if he were there, and is an enthymeme, which, with the suppressed premise restored, makes the following syllogism:—

\begin{align*}
\text{Fig. 2.} & \quad \text{A} \\
\text{Cameses. E} & \quad \text{H} \\
\text{Therefore E} & \quad \text{He is here.}
\end{align*}

The socrates is a collection of Barbara syllogisms, in which the suppressed conclusion of the first is a premias of the second, that of the second a premias of the third, and so on; as in A is B, B is C, C is D, D is E, therefore A is E. Here are three syllogisms, namely,

\begin{align*}
\text{A is B,} & \quad \text{A is C,} \\
\text{B is C,} & \quad \text{C is D,} \\
\text{A is E,} & \quad \text{D is E,}
\end{align*}

Various attempts were made to classify the moods in which common argument is to be expressed syllogistically. The only difficulty is to reduce the expressions to the pure form of simple assertion or negation. An oblique syllogism was one in which one of the oblique cases enters the premises in such a manner as to vitiate the purity of the fora. For instance, the thoughts of men govern his actions.

\begin{align*}
\text{John is a man.} & \\
\text{Therefore John's thoughts govern his actions.}
\end{align*}

As it stands, this is not strictly a syllogism, and some idiomatic expressions must be adopted before it can turn into one.
(Every man) is a being whose thoughts govern his actions.

John is a man, therefore John is a being, etc.

The same thing is true in modern syllogism, which is one in which some modifying expression gives more or less of force to one or both premises. As

Probably Every Y is X,
Every Z is Y, therefore
Probably Every Z is X.

If we consider both matter and form, we have here merely a syllogism in which one premise is only probable. [Probability, p. 28.] But, considering form only, the perfect deduction may be made as follows:

Every Y is X, the other is true, and therefore Every Z is X is a thing which is more likely than not to be true.

The *inductive* syllogism is merely one in which one of the premises is proved by induction, or by separate proof of every instance: as when the Ys are known to be A, B, and C, and no more, and X is Y, every Y is shown by proving separately that A is X, B is X, C is X. There is nothing peculiar to the syllogism here. [Induction.]

The *hypothetical* syllogism (so called) is one in which the truth of one proposition is stated to depend solely on that of another; so that the first can be affirmed as soon as the second is known to be true, or the second can be denied as soon as the first is known to be false. Thus,

If A be B, C is D
But A is B, therefore C is D.

If A be B, C is D
But C is not D, therefore A is not B.

Whenever a proof is complete, except in one proposition—when, for example, we have fully made out that C is D, except only in this that the proposition 'A is B' is not yet proved, the first member of the hypothetical syllogism lays down the terms of the argument. When all that will prove a proposition is true, the proposition itself is true, whence there is only need to affirm the one doubtful premise, to make the conclusion a logical consequence. Again, when a proposition is false, either one part of every syllogism must be denied: hence there is only need to deny the conclusion in order to make the one doubtful premise logically denied.

The *conditional* syllogism is valuable to an hypothetical one, in that it is when, under certain circumstances, the first member affirms a proposition, as in Wherever A is B, C is D.

The *dilemma* is a double or other compound syllogism, in which two or more contradictory propositions form each a conclusion with other propositions, so that from those other propositions necessarily follow one of the conclusions: because of contradictory propositions one must be true. It is not therefore a syllogism, but a collection of them. For example, 'He must either have been for, against, or neutral: if for, he was true; if against, he was false: therefore he must have been either unjust, mean, or false.' This presumes the existence of a premise for each conclusion; as for example, that the cause is that of oppression, that he is circumstanced that nothing but fear or favour can prevent him from taking part with the right, and that he has pledged himself to the wrong.

The rules of syllogism may be briefly condensed as follows:

1. One at least of the premises must be affirmative, and one at least universal; 2. the middle term must enter universally in one of the premises; and 3. the conclusion must not speak of any term in a wider sense than it was spoken of in the premises in which it has its place. A term universally spoken of is either the subject of a universal affirmative, or the predicate of any negative. The first rule is derived from observation, but might be demonstrated. The second is seen thus: if the middle term were not universally spoken of in one premise, there might be in reality no middle term, or nothing with which to compare the major and minor term. Thus if we attempt to infer anything from Every X is Y, some Ys are not Zs, we merely see that all the Xs are Zs, or make up a part of the Ys. Some of the Ys (another portion, it may be) are not Zs, so that the common term does not exist, or may not exist. The third rule is obvious, for no more can be made of any assertion than it contains, and an argument which asserts something about every X from premises which only mention some Xs, must be illogical. The various species of fallacies must consist either in the introduction of unproved propositions, or in the application of those which are proved. We do not feel it necessary to extend this article by entering into the usual classification of them.

SYLVERIUS, son of Bishop Hormidas, and a native of Campania, succeeded Agapetus as bishop of Rome, A.D. 535. Theodatus, the Gothic king of Italy, is said to have influenced his election. Soon after, Belisarius came with an army sent by the emperor Justinian, defeated the Goths, and took possession of Rome. Vigilus, a deacon of Rome, Condemn him with the court of Constantine people to have Sylvester deposed, on the pretence that he favoured the Goths, and Sylvester was accordingly seized by order of Justinian, and sent into exile to Patara, A.D. 537, where he soon died, and Vigilus went out in his place. (Platina and Panvini, La Vie des Pontifes.)

SYLVESTER I. succeeded Melchiades as bishop of Rome, A.D. 314. The Christian church was now in the ascendant throughout the Western world, under the protection of the emperor Constantine. By Constantine's orders a council was assembled at Arles (Aries), A.D. 314, at which some deputies of the bishop of Rome were present, and in which the Donatists were condemned. [DONATISTS.] For this the chief event of Sylvester's pontificate the great council of Nicea, A.D. 325, which defined the articles of the Christian faith, and also determined the order of the hierarchy in the various provinces of the empire. The bishop of Rome was thereby made primate over the sees of Asia, and the provinces of Suburbicarian jurisdiction were distributed of the empire made by Constantine, were placed under the jurisdiction of the Vicarius Urbis, or imperial vicar of Rome. Sylvester did not repair to the council, but sent thither two presbyters as his deputies. Vitus and Vincentius, who do not appear to have had any part in the decision or test of honour in the assembly. [Pope.] The story of the donation made by Constantine to Pope Sylvester of temporal jurisdiction over the suburbicarian provinces is not universally rejected as apopryphal; it may have originated from the church historians confounding the temporal with the spiritual jurisdictions. Constantine made a short residence at Rome in Sylvester's time, A.D. 326, but soon left it, being, it seems, dissatisfied with his reception by the people (PLATINIUS VALERIUS.) The papal historians speak of numerous churches raised and endowed by Constantine at or near Rome. [LATERAN.]

Sylvester died A.D. 326, and was succeeded by Marcus. For the subsequent synods and decreets are now considered apopryphal. (Platina and Panvini, Vita dei Pontefici; Walch, History of the Popes.)

SYLVESTER II. [GERBERT.]

SYLVESTRIC. [SYLVIADE.] SYLVIADÆ, Mr. Vigors's name for a family of Dentistres, the second tribe of his order INSECTES.

Mr. Vigors remarks that the Sylviadæ, the Warblers of our British ornithologists, assimilated as they are to the MARTINIDÆ in the sweetness and compass of their vocal powers, differ from that group of birds in certain delicate structure and more subulate bill. That portion of the Linnean Motacilla, or of the Sylviæ of Latham, he observes, which Bechstein has separated from the genus under the title of Acripsis, in conjunction with that which embraces Sylvia tusciana [NIGHINIANAFE], appears to be the group most nearly approaching the Thrushes by the comparative strength of its formation. Here also, perhaps, we may think we find the Hylotis, Temnat, of the New York ornithologists, more closely related to the Sylviadæ, than to their stronger bills. Hence, he continues, a number of intervening groups (among which Brachypteryx, and that which includes Sylvia rubecula, the Redbreast, are especially noticed by him) conduct the inquirer by their gradually lessening and more slender form of the delicate body, the tapering legs, and the gracile and subulate bill point out their typical supremacy in the
family. To these latter groups he considers Meliphagidae, Leach, the Dartford Warbler, and Malurus, Vieill., the representative of Sylvia in Australasia (in both of which the bill deviates from that of the conterminous genera in the upper mandible being somewhat arched), nearly allied and also the Wagtails (Troglodytidae and Regulus, Linn.). To these he makes a number of groups whose chief tarsi indicate that their natural station is on the ground, such as *Sylvia* (Sw.), the true Motacilla of authors; and *Enicurus* and *Curruca* would add, for instance, *Heteros* and *Anthus*, Bechtt., which unites, in his opinion, the *Drosciinae* with the *Conirostrinae*, by means of the larks, *Alecto* of authors. (Lamk.) Mr. Vigors then states that Saxicola, Bechtt., is nearly allied to the larks in its minute size, but with prodigious conformation of bill, its increasing bill, brings us round to the earlier groups of the present family, and thence to the *Merulidae*, with the section *Saxicola*, of which it is, he thinks, nearly connected. The family is divided into many groups, which families may be brought into contact with each other, explains, in his view of the case, the manner in which the genus *Saxicola*, the section of *Merula* *Saxicola*, the genus *Myiothera*, and the more delicate forms of *Thamnophilus*, are each seen in approaching each other, yet belonging to the different families of *Sylviinae*, *Merulidae*, and *Klaididae*, still preserve their union, and are brought together into a conterminous assemblage.

The true *Wren* display, in his opinion, so close a similarity between them as to suggest their common habits to *Parus*, Linn., the *Titmouse*, that we may at once acknowledge the affinity between the latter family and the Pipridae, upon which family he enters by the *Tityrus*. (Linn. Trans., v.)

Mr. Swainson also places the *Sylvia* in the dentirostral order. "The chief peculiarity," says zoologist, "which runs through this numerous family, is the very small size and delicate structure of its individuals. Excluding the largest birds, we may take as the smallest birds of the creation. The diminutive golden-cresets, the nightingales, the white-throat, and the woodwrens, are all well-known examples of genuine warblers, familiar to the British naturalist. The groups of this extensive family spread over all the habitable regions of the globe, are destined to perform an important part in the economy of nature: to them appears intrusted the subjugation of those innumerable minute insects which lurk within the buds, the foliage, or the flowers of plants; and thus protect from swarms to which they are only exposed during flight. The diminutive size of such insects renders them unfit for the nourishment of the thrushes and the larger insectivorous birds, while their minute form renders them the easy prey of the boughs which are shaken and their retreat disturbed. How enormous then would be their multiplication, had not nature provided other races of beings to check their increase? No birds appear more perfectly adapted for this purpose than are the small warblers noticed by him. He finds, in the most part, on the first appearance of spring, when the insect-world is called into life and activity by the renewal of vegetation; and their departure towards autumn, when the insect-lusts diminish, and consequently no longer require the agency of these little birds to keep their numbers within due bounds. He remarks, that as different localities are assigned to different tribes of insects, so a similar diversity of haunts is allotted to the various groups of warblers. Thus in the same wood warblers are found to confine themselves principally to the higher trees, where they search for winged insects among the leaves, or capture them, like the flycatcher, when attempting to escape. The reed-warblers and the nightingales (Philomelinae) haunt, he observes, the vicinity of waters, or the reed-beds, followed by hedges, for insects peculiar to such situations. The stonechats (Saxicoline), on the contrary, prefer, he remarks, dry commons and wide extended plains, feeding on insects appropriated to those localities. These authorities are then those trees in which the nest is built, and which are the chosen food of the wagtails and titlarks (Motacillinae); and, lastly, he points out that the Parus, or titmouse, search assiduously among the bushes and tender shoots of trees, thus destroying a multitude of their enemies to vegetation."

Mr. Swainson thus arranges this family, "marked by peculiarities of habit no less than by a variation of structure applied to such habits!"—P. C., No. 1478.

### Subfamilies. *Sylvinae, or Warblers.*

1. **Typical.**
   - Bill very slender, compressed; lateral toes unequal. *Sylvinae.*

2. **Subtypical.**
   - Bill and general structure more robust. *Philomelinae.*

3. **Abridgment.**
   - Bill depressed at its base; legs lengthened; strong. *Saxicoline.*

*Genera:*—

1. *Thamnophila,* Sw.; *Saxicola,* Linn.; *Enicurus,* Bechtt.; *Ludus,* Sw.; *Curruca,* Linn.; *Heteros,* Bechtt.; and many others.

2. *Motacilla,* Linn., with the subgenera *Apus,* Vieill.; *Cauticus,* Vig.; *Strigula,* Linn.; *Chrysotus,* Vig.; *Parus,* Linn.; *Pipridae,* Sw.; and *Fringilla,* Temm.; *Sylviinae,* or Warblers.


*Parus* is a genus of the Warblers, comprising the great-nesters, and belonging to the American genus *Seuris* (Titticra); and among the true warblers (*Sylvia*), by the genus *Civitcra*, comprising the great-nesters. He then treats of the Philomelinae, or Nightingale warblers, and concludes his inquiry by an examination of the fifth or 'grallatorial genus,' the *Saxicoline.*

**Subfamily Character.—** All the universally small. Bill very slender, distinctly notched. Feet formed for walking, perching, or climbing. Tarsus slender, lengthened. (Sw.)

**Subfam. Saxicoline, Stonechats.**

**Subfamily Character.—** Bill depressed at the base: gape with diverging bristles. Feet lengthened. Tail rather short. Head large.

**Genera:**—

1. *Grallina,* Sw.; *Turdus,* Sw.; *Saxicola,* Linn.; *Ergithrus,* Bechtt. (Robins) (with the subgenera *Ergithrus,* Sw.; *Parus,* Linn.; *Pipridae,* Sw.)

**Subfam. Philomelinae, Nightingales.**

**Subfamily Character.—** General structure larger and more robust than the typical warblers. Feet formed for perching.

**Genera:**—

1. *Phenicura,* Sw. (Redstarts); *Philomela, Antiquium, Nightingales); *Curruca, Bechtt.; Bredgypsia, Sw.; Agroates, Sw.*

**Subfam. Sylviana, True Warblers.**

**Subfamily Character.—** Bill very slender, straight, and with the under mandible much thinner than the upper. (Sw.)

**Genera:**—

1. *Orthotomus,* Horstf.; *Malurus,* Vieill. (with the subgenera *Hemipetricus,* Sw.; *Drymoica,* Sw.; *Meliphaga,* Leach; *Melocharis,* Linn.; *Melocharita,* Linn. (with the subgenera *Sylvia, Acanthiza,* Horstf.; *Regulus,* Vig.; *Regulus,* Ray; and *Camarotis, Sw.*; *Culicivora, Sw.; Praticola, Sw.*

**Subfam. Pariana, Titmice.**

**Subfamily Character.—** Bill either entire or very slightly notched, more or less rounded. Tarsus never shorter than the hind-toe, which is large and strong. Lateral toes unequal. (Sw.)

**Genera:**—

1. *Setophaga,* Sw.; *Sylvia, Sw.* (with the subgenera *Dumetella,* Sw.; *Sylvia,* Sw.; *Termitina,* Sw.; *Miostitia, Vieill.; Zoia, Bechtt.; and Horstf. and Vigors, Linn. (with the subgenera *Agregilis,* Vieill.; *Agregilis,* Vig.; *Parus, Linn.; Pariona, Sw.; and *Fringilla,* Temm.); *Acerorhynchus, Bechtt.* (with the subgenera *Sw.); *Fringilla, Temm.*

**Subfam. Motacillinae, Wagtails.**

**Subfamily Character.—** Bill lengthened; and slender. Legs long, formed for walking.
too much longer than the rest. Wings pointed. Tail narrow, and much lengthened. (Sw.)

Genera.—Lessonia, Sw.; Budgies, Cuv.; Motacilla, Linn.; Encius, Temm.; Anthus, Bechst. The family stands between the Meridae and the Ampe-

The Calamomperine, Sylvia, Saxicolinae, Motacillinae, Pareine, and Sylvisclinae are arranged by the Prince of

This family makes the Sylviae the first family of his third tribe (Dentinece) of Insecntes, with the fol-

— 1. Malurinae.

Genera.—Orthotomus, Sw. (Edela, Less.); Ploina, Hor. 

3. Saxicolinae.

Genera.—Cypochysus, Wagl. (Graula, Gm., Gyttiletra, Sw., Cercotrichas, Boie, Lalage (Boie), Sundev., Kilcatilca, Gould, Notadelia, Less.), Rutilacia, Ray (Feodea, Bechst., Phaenora, Sw., Motacilla, Linn., Cygnia, Gm., Cracidea, Bl., Motacilla, Linn., Sylvia, Linn., Calioppe, Gould (Acceptor, Temm., Motacilla, Linn., Turdus, Gm.), Orocetes, G. R. Gray (Phaicuica, Vit., Petropelia, Sw.), Rutilla, Brehm (Danae, Linn., Motacilla, Linn.), Stilatia, Sw. (Pylaia, Linn.), Petroica, Sw. (Musci-

4. Accipiter.

Genera.—Accipiter, Bonap. (Motacilla, Gm.), Elaeio-

5. Purna.

Genera.—Egiphia, Vit. (Remiz, Cuv., Pendulius, Brehm, Parus, Linn.), Melanochlora, Less. (Parus, Linn.), Parus, Linn.; Suthora, Hodge; Minla, Hodge; Messi, Hodge; Rutilus, Gould; Meropogon, Bl., Zetoreca, Gould; Iorio, Hor. (Parus, Gm.); Tyrannus, Vieill. (Pipra, Spix, Sylvia, Linn.); Sphenostoma, Gould; Calamochalus, Linn. (Myta-


Genera.—Sylviparus, Burt; Dunecola, Sw.; Sylvicola, Sw. (Parus, Linn.), Linn., Eula, Boie, Parus, Bonap. 


Genera.—Sylviparus, Burt; Dunecola, Sw.; Sylvicola, Sw. (Parus, Linn.), Linn., Eula, Boie, Parus, Bonap. 

— 5. Malurinae. 

Genera.—Musciusia, D'Orb. (Lessonia, Sw., Prionus, Gould); Motacilla, Linn.; Budgies, Cuv. (Motacilla, Linn.); Encius, Temm. (Motacilla, Linn.), Turdus, Gm.; Grallina, Vieill. (Tangara, Oppel); Epithamnus, Gool. (Aenigmati, J. B. et J.); Anthus, Bechst.; Cordyline, Vit. (Anthus, Vieill.). Of these names, Petropelia and Wilsonia are terms em-

The Sylviae, in Mr. G. R. Gray's arrangement, are followed by the Turdidae. (List of the Genera of Birds.) 

Mr. Osiris G. Gray's name for a genus of Ruminants, placed by him in the family Bovidae [Ox] with the following

Generic Character.—Horns in the male only. Maxili-

ary glands oblong. Interdigital fossae small. In-

ternal folicles none. Testes four. Type, Sylviscapra mergens (Antilope mergens). [Ante-

lope, vol. ii., p. 81.]

SYLVICOLOM [SYLVIAE.]

SYLVIPARUS, Mr. Burton's name for a genus of birds combining the characters of Sylvia, Regulus, and Parus in the wing, tail, and bill. 

Generic Character.—Bill very small, very short, compressed, except at the base; mandibles equal, the upper one a little arcuated at the tip; nostrils present, with setae. Feet as in the genus Parus. Wings rather long, extending nearly to the end of the first; quill rather short; second, third, and fourth equal, and the longest, the fifth, rather smaller than those, and the sixth equalizing the first. Example, Sylvia'parus modestus. 

Description.—Body above brownish-green, below greenish-

white; quills and tail-feathers brown; the external pomegine ciliated with yellowish-green. Bill and feet black. Total length four inches.

Locality.—The Himalaya Mountains. (Zool. Proc. 1853.]

SYLVIIVS, ANEAS. [Pru II.]

SYMBOLS AND NOTATION. The word symbol (from the Greek symbolon, "bread token") means 'that which is taken with,' and a symbol is a mark which is always attached to some one particular meaning. Notation (nota, a known mark) is the method of selecting and assigning meaning to symbols, and the theory of notation if it yet deserve the name includes the construction and choice of symbols with the formation of rules of selection, so as to take the symbols which are best adapted for the purpose.

This subject might be treated in a very wide manner, for all marks or signs, understood to convey written words to direction-posts. A picture is a symbol, the force of which lies in the resemblance to its object, and many of the earliest symbols must have been pictorial. It is obvious that a general treatment of the subject would hardly be within the power of any one person, and that its extent would be enormous, though it would be desirable to have it discussed in a more general form than has yet been attained, in order that its different parts may receive aid from the rest. Symbols are to the progress of civilization precisely what mechanism is to the arts,—not a moving force, perfectly dead in themselves, but capable of being made the medium by which the power is conveyed to its destination, and adapted to its object. They are the instruments of our first thoughts and the originators of new ones. The process, with the earliest signs, is one of teaching, and gives a higher intelligence than that which produced them, which last was again employed in perfecting the symbols them-

selves, and so on alternately, exactly resembles what has taken place in the case of rude tools, these rudest tools were first employed to make better ones; and as each improvement in the use of force has found one of its best applications in the construction of machinery itself.

We propose in this article to treat particularly of mathem-

atical notation, which, like language, has grown without much looking to, at the dictates of convenience and with the sanction of the majority. resemblance, real or fancied, has been the first guide, and analogy has suc-

Signs are of two kinds,—1st, Those which spring up and are found in existence, but cannot be traced to their origin; 2ndly, Those of which we know either the origin, or the
epoch of introduction, or both. Those of the first kind pass into the second as inquiry advances. [ALPHABET.] In our present subject we have mostly to deal with the second class.

Mathematical marks or signs differ from those of written language in being almost entirely of the purely abstractive character, since it is possible that any formula might be expressed in words at length. We say possible, because it is barely so, not meaning thereby to imply that the mathematician is never, or, but more occasionally, not conscious of the impossibility of expressing in words a well-understood collection of notions, however extensive, becomes simple as a matter of conception by use and habit, and thus becomes a convenient representational point of the mind. It is something of a binomial of identity. Now it is the characteristic of the advance of human knowledge that the mind never grapples at once with all that is contained in the notions under use for the time being, but only with some abstraction derived from the previous result, or some particular quality of that result. Hence no symbol which should contain the representative of every idea which occurred in the previous operations would ever be necessary; and more than this, it would even be pernicious from its complexity, as also from its suggesting details which are not required. That generalisation, or rather abstraction, which is the distinctive character of the civilized language as compared with the savage (though the latter is not wholly without it), must be the rule of process of mathematical notation, so far as our present aspect of view the connection of our subject with speech presents more analogies and gives more instruction than its comparison with the written signs of speech. The latter is a bounded subject of all the former, and its meanings and uses of sound shall be represented, written language follows immediately; nor do the infinite modes of using words require any modification of the method of writing them. In our modern works for instance, it would be difficult to find many instances of notation which would compare with the never-ceasing varieties of mathematical signs. In mentioning the marks of punctuation and reference, the italics for emphatic words, and the varieties of print by which notes are distinguished from text, &c., we have almost exhausted that.

The greatest purposes of notation seem to be answered when the reader or learner can tell what is meant, first, with the utmost certainty, secondly, with sufficient facility; it being always understood that the second must be abandoned when it clashes with the first. Too much abbreviation may create confusion and doubt as to the meaning; too little may give the meaning with certainty, but not with more certainty than might have been more easily attained. Thus the old algebraists, in and in this point in the notation, used ten symbols where two only are requisite; and those who first adopted the symbol A, in their transition from words at length to simple notation, used ten symbols where two only are requisite; and those who first adopted the symbol A, lost no certainty, and gained materially in simplicity. But the latter system, as we shall see, A, A, A, A, A, &c., to stand for the successive powers of A, were surpassed in the same manner by those who adopted A, A, A, &c. Beyond this it is obvious the notation cannot go in simplicity. The symbol which is to represent 'A as multiplied together' must suggest all three components of the preceding phrase—namely, A, n, and A, multiplied together. In A, the n and A are obvious, and the position of the letters is the symbol of multiplication; but, on the other hand, A is more or less of a square described on the line A purchase simplicity at the expense of the certainty. The same mathematical phrase with them stands for two different things, connected indeed, but of more dangerous consequence from that very connection; for in the former case the reader should not be allowed to convert them into identities. It is of as much importance to impress the distinction of the things signified, as the analogy of their properties.

Common observation is the greatest facility of obtaining it, seem to be the main points of good notation; and this is true with respect to the learner of all that has gone before. Grant that the mathematical sciences are never to advance further, and many alterations might be made, and many new ones added, without acquiring the past, without any introduction of obscurity. But the future must also be thought of; and no scheme will merit approbation which enlightens one end of the

avenue at the expense of the other. Notation influences discovery by the suggestions which it makes: hence it is desirable that its suggestions should be so many, as plain, and as true, as it is possible. Here we are on quite a different ground, in reference to the same problem, that the imagination is the discoverer; and it might turn out that a notation which suggests many and obvious new ideas, though some of them should be fallacious, would be preferable in its consequences to another of less suggesting power. In the indication of part of its nature of direction of growth; and must find its ways and symbols used in the way perhaps of some other part of the symbol. In throwing together a few rules, previously to a little description of the present state of mathematical notation, we do not pretend to have exhausted the list of notions which the subject requires. It is to be remembered that the language of the exact sciences, instead of being, as should be the case, a separate subject, is hardly ever treated at all, and then only in connection with some isolated parts of the system. With the exception of an article by Mr. Babcoat, in the Edinburgh Encyclopedia, we do not know of anything written in modern times on notation in general. Much may be collected, having notation for its specific object, from the writings of Arbegast, Babcoat, Carnot, Cauchy, J. Herschel, and Peacock; and these will show the connection of our subject with the present knowledge of the subject. When proposing a new symbol or modification of a symbol, to assign some reason for the proposal. In general, however, it is the practice to adopt or reject notation without giving any just reasons for the choice. It is necessary, when a new symbol or modification of a symbol is to be rendered necessary, by the force of opinion, that every author should, in making a new symbol, explain the grounds, firstly, of his departure from established usage, secondly, of his choice from among the different methods which would most obviously present themselves,—two distinct advantages would result. In the first place, we should in most cases retain that which exists, until something was to be gained by altering it; in the second, research and ingenuity would have a call into action which does not now exist. We have reason to believe that the mathematician as the progress of his science now depends more than at any previous time upon the protection of established notation, when good, and the introduction of nothing which is of an opposite character. We should rather say the rate of progress; for, however bad may be the immediate consequences of narrow and ignorant views in this respect, they cannot be permanent. The language of the exact sciences is in a continual state of whole, and the errors which arise under the circumstances, unless incongruous, obstructive, and even useless. Had it been otherwise, it is impossible that the joint labours of three centuries and many countries, of men differing in language, views, studies, and habits, could be preserved in compact form: the modern mathematician is, to a great extent, a composite being, living in the midst of many defects and ignorance. In the present state of the exact language of mathematics must be admitted to present.

The following rules and cautions, with respect to notation, are drawn from observation of the present state just alluded to.

1. Distinctions must be made as far as necessary, and they must be sufficient. For instance, in a letter the use of small letters or small letters, whatever may guide the inquirer to adopt either in one case should lead him to the same in another, unless some useful distinction can be made by the change. Thus a writer who in one instance uses a capital letter to denote a complex combination of small letters (which is a very desirable mode), in another part of the same question employs a small letter for a similar purpose, thus nullifying an association of ideas which per se might be very desirable. If a course were reversed in the first case, it is still more so in the second. It is not often that the second part of this rule is infringed; so small an addition makes a sufficient distinction, that the principal danger which arises in that of the same kind of difference occurring in the converse cases in different problems.

The tendency to error is rather towards over than the contrary. It is surprising how little pegrates the beginner in mathematics upon the
a difference as that of a and an implies two totally different numbers, neither having any necessary connexion with the other. The older mathematicians [ACCENT] overdid the use of distinctions in their uniform adoption of different and unconnected letters, and forgot resemblances.

The simplicity of notative distinctions must bear some proportion to that of the real differences they are meant to represent. Distinctions of the first and easiest order of simplicity are comparatively few; the complications of ideas of the higher elements of reasoning are so varied and varied to infinity. There is no better proof of skill than the adaptation of simple forms to simple notions, with a graduated and ascending application of the more complicated of the former to the more complicated of the latter. A writer who has retained undiminished the language of that awkward mixture of long and short words to which the idiom of our language frequently compels them in their written explanations of the formulæ. For example, if there be two words of more frequent occurrence than any others, they are numerator and denominator; the parts of a fraction cannot be described under nine syllables.

A mathematician will have occasion to write and speak these words ten thousand times, for every occasion on which he would use the word curve, of a function. A comparatively new idea, or a complicated subject, can be expressed in one syllable, while the never-ending notions of the parts of a fraction require nine: this he cannot help; but it is in his power to avoid the same sort of inversion in his formulæ.

3. Pictorial or descriptive notation is preferable to any other, when it can be obtained by simple symbols. Many instances occur in astronomy, and the use of the initial letters of words may be cited as a class of examples: as in formulae for the laws of gravity, &c., &c.

4. Legitimate associations which have become permanent must not be destroyed, even to gain an advantage. The reason is, that the loss of facility in reading established works generally more than compensates for the advantage of the proposed notation, which, unless it happens that the desired object absolutely requires an invasion of established forms. For instance, perhaps the most uniform of all the notations of the higher mathematics is the use of the letter d to signify an increment which is either infinitely small, or may be made as nearly so as we please. A few Cambridge writers have of late years chosen to make a purely arbitrary change, and to signify by dy, dx, &c., not increments, but limiting ratios of increments; and students trained in these works must learn a new language before they can read Euler, Lagrange, Laplace, and a host of others. Thus d,y has been made to stand for dy: dx, and the old association connected with d,y has (in the works spoken of) been abandoned. Now if d had been employed instead, the only harm would have been that the student would have had to learn a new language before he could communicate with the greatest mathematicians; as it is, many will have to form a new language out of the materials of their own. But this is not of so much importance.

5. Analogies should not be destroyed, unless false: for true analogy has been frequently the parent of discovery, and always of clearness. Thus the real analogy of \(\frac{dx}{dy}\) and \(\int f(x)dx\) was lost to the eye by the use of \(\int f(x)dx\) to signify the latter; an innovation which preceded the one last mentioned, and has obtained more approbation in this country. The notation used by Fourier to express a definite integral, \(\int f(x)dx\), will certainly prevent the spread of the one just alluded to; though this last itself is chargable with breach of analogy: for \(\int f(x)dx\), \(\int f(x)dx\), &c., ought to represent the successive integrals of \(f(x)\). Fortunately, however, the symbols \(\int f(x)dx\), \(\int f(x)dx\), &c., may represent these successive integrals; and thus the two notations may be combined. For instance, \(\int f(x)dx\) represents the fourth integral of \(f(x)\), each integration being made once from 0 to \(x\).

6. False analogies should never be introduced; and, above all, the incorrect analogies which custom and idiom produce in language should not be perpetuated in notation. It is a defect common to make editions of Euclid in which are called symbolical, and which are signs in the place of many words. To this, if properly done, there cannot be any objection in point of correctness: nor can we take any serious exception to the use of \(\bigcirc AB\) to stand for the square on \(AB\), to \(\bigcirc\) for parallel, \(\angle\) for perpendicular, &c. But when we come to \(AB, BC\) for the rectangle on \(AB\) and \(BC\), \(AB\) for the square on \(AB\), we feel the case to be entirely altered. There are already so many conventions in the use of the words which should have both an arithmetical and a geometrical meaning, and causes plenty of confusion: a good notation, if it cannot help in avoiding this confusion, should at least not make it worse. At any rate, all, with regard to symbolic geometry, we feel some repugnance to introduce it into the elements, from observing that all the best writers seem to feel with one accord that pure reasoning is best expressed in words at length. If it be desirable that a student should obtain to drop more tokens, the connexion process with process, and to think of process alone in the intervening time, it is also most requisite that he should have a corrective of certain bad habits which the greatest caution will hardly hinder from springing up while he is thus engaged. Arithmetic and algebra supply answer the first end; and geometry, in the manner of Euclid, is the correcting process. Will symbolic geometry do as well? We will not answer positively, but we must say we doubt it.

Notation may be modified for mere work in a manner which cannot be admitted in the expression of results which are to be reflected upon. The mathematical inquirer must learn to substitute, for his own private and momentary use, abbreviations which could not be tolerated in the final expressions of his results. Work must be shorter, and the tendency to error materially diminished, by attention to this suggestion.

For example, the complexity of the symbols

\[
dx \ dx \ ds \ dx \ dz
\]

\[
dx \ dy \ dx \ dy \ dy
\]

greatly impedes the operations connected with problems in solid geometry: the letters \(p, q\), which are often substituted for them, make us lose sight of the connection which exists between the meanings. But the symbols

\[
p \cdot p + q \cdot q + r \cdot r
\]

are not long nor complicated enough to partake much of the disadvantage of the complete symbols, while they are entirely free from that of the isolated letters.

8. In preparing mathematical writings for the press, some attention should be paid to the saving of room. In formulæ which stand out from the text, this is not of so much consequence; but in the text itself a great deal of space is often unnecessarily lost. For example, it is indispensable in formulæ to write a fraction, such as \(\frac{a}{b}\) in the manner in which it here appears: but if this be done in the text, a line is lost; and, generally speaking, \(a/b\) or \(a-b\) would do as well in the text as in notation.

Also, in printing, redundancies which are tolerated in writing, should be avoided, such as \(\sqrt{}/\), where \(\sqrt{}/\) would do as well.

9. Strange and unusual symbols should be avoided, unless there be necessity for a very unusual number of symbols.

The use of script letters, such as \(\mathcal{N}, \mathcal{B}, \mathcal{C}\), &c., or old English letters, as \(\mathfrak{A}, \mathfrak{B}, \mathfrak{S}\), &c., except in very peculiar circumstances, is barbarous. A little attention to the development of the resources of established notation will prevent the necessity of having recourse to such abstractions. Nor is it wise to adopt those distinctions in print which are easy to make in writing, only because they are easier to preserve: such as the use of \(A\) and \(a\), &c., in different senses; even the distinction of Roman and Italic small letters, \(a\) and \(a\), &c., should be sparingly introduced.

10. The worst of barbarisms is that of introducing symbols which are quite new in English, and perfectly understood in common, language. Writers have borrowed from the Germans the abbreviation \(n!\) to signify \(1 \cdot 2 \cdot 3 \ldots \ldots (n-1) \cdot n\), which gives their pages the appearance of expression which is supposed to be scientific, that \(2, 3, 4, &c.\), should be found in mathematical results.

The subject of mathematical printing has never been methodically treated, and many details are left to the compositors which should be attended to by the mathematicians. Until some mathematician shall take printer, or some printer, as a good mathematician, it is hardly to be hoped that this subject will be properly treated.
The elements of mathematical notation are as follows:

1. The capitals of the Roman alphabet, and the small letters of the Italic. The small Roman letters and the Italic capitals are rarely used, and should be kept in reserve for rare occasions.

2. The small letters of the Greek alphabet and such capitals as are distinguishable from the corresponding Roman ones, as Δ, Φ, Ψ.

3. The Arabic numerals, and occasionally the Roman ones.

Of all these there should be three different sizes in a good mathematical press, and the different sorts should bear a much better proportion to one another than is usual. The Greek letters seldom occur properly with the Roman ones, and few indeed are the instances in which such symbols as

\[ a = \alpha (1 + \beta)^\gamma \]

are, as they ought to be, good copies of the manner in which they are written. The handwriting of a bad writer is frequently more intelligible to the mathematical eye than the product of the press. Among the faults to which the compositor is naturally subject, and which frequently remain uncorrected by the author, is that of placing blanks or spaces between the character of a negative sign, as in \( a - b \). A general rule, the manuscript should be laid together.

4. Accents, superfixed and suffixed, as in \( a^\prime \). These are generally continued, when they become too numerous, by Roman numerals, as in \( a^\prime, a'^{\prime}, a'_{\prime}, a''_{\prime}, \&c. \) The accent is often used to separate the numerator from the denominator. Of these there are generally not sizes enough, particularly as to the sign \(-\). It frequently happens that such an expression as \((x-1)(x-2)(x-3)\&c.\) overruns a line very inconveniently. In the case \((x-1)(x-2)(x-3)\) would avoid such a circumstance altogether. Between the division line of a fraction and the numerator and denominator unsightly spaces very often occur, as in

\[ \frac{a+b}{c+d} \]

6. The integral sign \( \int \) with its limits expressed, as in

\[ \int_a^b \]

The symbols of nothing and infinity, \( 0 \) and \( \infty \).

7. Brackets, parentheses, \&c. \{, (1), \}. These are often not properly accommodated to the size of the intervening expressions, particularly in thickness.

8. The signs of equality, \&c. =, \( \approx \).

9. Occasionally, but rarely, a bar or a dot is used over a letter, as \( \bar{a} \) or \( \dot{a} \). In some works, accents and letters are placed on the left of a symbol, as in \( a, a', a'' \). This may often be avoided, as it is difficult to tell to which letter the symbol belongs; and there are ample means of expression in what has been already described.

There are no general rules laid down for the use of notation; a few hints however may be collected from the practice of the best writers of recent times.

1. When a letter is to be used often, it should be, if possible, a small letter, not a capital. The latter species is generally used for functions of small letters.

2. The letters A, B, C, D, and E are appropriated for operations of the differential calculus, and should hardly ever be used in any other sense.

3. When co-ordinates are used, the letters \( x, y, z \) must be reserved to signify them; \( x, y, z \), \( x, \dot{y}, \dot{z} \) may be used for different species be required, and if \( x, y, \dot{z} \), \&c. or \( x, y, z \), \&c. should not be judged convenient.

4. When functional symbols are wanted, the letters \( \phi, \chi, \psi, \phi, \psi, \phi, \psi, \phi, \psi, \) should be reserved for them; afterwards \( w, w, w, w, \) sometimes \( v, \mu, \nu \).

5. The letter \( w \) is, by universal consent, appropriated to 3\(^{11}1\):49\ldots; \( s \), by the French, to \( t \); \( t \) to the functional symbol for 1.2.3\ldots..t.

6. When many operations of differentiation occur, superfixed accents should be avoided in any other sense than that of differentiation.

7. When exponents are wanted to aid in signifying operations, the powers should be carefully distinguished.

Thus, in a process in which \( \sin^2 \alpha \) is used for the angle whose sine is \( \alpha \), the square, cube, \&c. of \( \sin \) should not be \( \sin^2, \sin^3, \&c. \) but \( \sin\alpha, \sin^2\alpha, \&c. \) Some writers would have the latter notation employed in all cases; but this is, we think, a little too much.

3. Greek letters are generally employed for angles, and italic letters for lines, in geometry. To this practice it is desirable to adhere as far as possible, but it cannot be made universal.

9. Suffixes are generally the particular values of some function. Thus \( a, f, \phi \) means a function of \( \phi \), of which the values for \( \phi = 0, \phi = 1, \&c. \) are \( a, a, \alpha, \&c. \)

10. As to the radical sign, \( \sqrt{a}, \sqrt[4]{a}, \&c. \) do not generally mean any one of the four square roots of \( a \), \&c. of \( a \), but the simple arithmetical root. The indeterminate root is usually denoted by the exponent. Thus \( a \pm \sqrt{b} \) may be necessary, but \( a \pm b \) has a superfluity.

11. The same letters should be used, as far as possible, in the same sense throughout any one work, and some preceding good writer should be followed. As a general rule, those only are entitled to invent new symbols who cannot express the results of their own investigations without them.

The writer who is most universally acknowledged to be a master of this art is Drusius, whose name is sufficiently mentioned in the style. His subject is of great importance; but fortunately it is pretty certain that no really bad symbol, or system of symbols, can permanently prevail. Mathematical language, as already observed, is, and always has been, in a state of gentle fermentation, which brings up and rejects all that cannot assimilate with the rest. A received system may check, but cannot ultimately hinder, discovery: the latter, when it comes, points out from what symbolic error it was so long in arriving, and suggests the proper remedy.

For the progress of mathematical language, see TRASCENDENTAL: also SYMMETRY.

SYMA. [KINGFISHERS]

SYMMINGTON. [STRAM CARRIAGE, vol. xxii., p. 457; STRAM. VERS.-1846.]

SYMMACHUS THE SAMARITAN, so called because he was a native of Samaria, and at first also of the Samaritan religion. He afterwards became a Jew, and then a Christian of the sect of the Ebionites. The time in which he lived is not quite certain, though it is probable that it was in the reign of the emperor Septimius Severus, about A.D. 200.

Although subsequently to the Septuagint two other Greek translations of the Old Testament had been made by Aquila and Theodotion, Symmachus undertook the same task again. His translation differed in many points from those of his predecessors, but it was held in high esteem, and is often referred to by subsequent writers: it is especially praised for the perspicuity and elegance of the style. Symmachus himself published a second and improved edition of it. We only possess a few fragments of this translation, which are printed, together with those of Aquila and Theodotion, in the edition of Matthew of Parisius Drusius and Montfaucon. Symmachus also wrote a Commentary on the Gospel of St. Matthew, in which he is said to have endeavoured to establish the dogmas of the Ebionites, and also to have attacked Matthew's genealogy of Christ.

(Fabrius, Biblioth. Graec. iii., p. 695; &c.; Schill, Geschichte der Griech. Lit., ii., p. 301, &c.)

Among the scholiasts on the comic poet Aristophanes there is one whose name was Symmachus; some specimens of his scholia are extant. (Fabricius, Biblioth. Graec. ii., p. 314, n. 4; cf. Sur.)

SYMMACHUS, QUINTUS AURELIUS, the son of L. Aurelius Avianus Symmachus, who was a man of great worth, and in A.D. 365 was prefect of the city of Rome. (Ambrosian, Marc. xvi. 2.) Symmachus lived in the time when his son Q. Aurelius Symmachus was born; uncertain; some would place it as early as the year 314, which is scarcely credible. As he belonged to one of the most illustrious Roman families, his education was conducted with the greatest care. He was instructed in rhetoric by a Gaul, whose name is not known. (Symmachus, Epist. ix. 86.) In A.D. 370 he was proconsul of Africa, and fourteen years later, A.D. 384, he was prefect of the city, and lived in 391 corresponded with St. Basil of Caesarea. In the year 404. It is uncertain, though it is evident from his writings that he was alive in A.D. 404.

Symmachus was a man of ability and character, during the difficult and dangerous situations into which
was thrown by the events of the time, he showed a degree of honesty and prudence which are rarely met with in the history of those times. He was one of the last great bulk of paganism, and exerted all his powers to prevent its overthrow, especially during the period of his pontificate of the city. We still possess an address of his to the emperors Valentinianus, Theodosius, and Arcadius (Symmach., Epist. x. 61), in which he endeavours to persuade the emperor to adopt the Christian religion. We do not quote the whole, but it is given in the works of the later Roman. However, his exertions were fruitless, and his address was refuted by St. Ambrose. His assertion that the Christian religion was the cause of the decline of the empire proved to be erroneous, for even the most sacred command of the poor Man of Peace, Fronto, had to wait for the pope, and for a long time he refused the charge. His partiality for paganism and its superstitions arose from his general attachment to the institutions of his forefathers, and his sincerity in this respect was acknowledged even by his adversaries. During the greater part of his life he was active engaged in various branches of the administration, but he devoted to study all his leisure time, which he spent in retirement in some of his numerous country seats.

There is extant a collection of letters by him, which was made and published by his son, Q. Flavius Memmius Symmachus, who was prefect of the city in A.D. 415, after the death of his father. The collection consists of ten books; much care has evidently been spent upon the style, and, like all the letter-writers of this period, he styles himself after Cicero and Pliny as his model. The style is concise and animated, but is far from the natural and beautiful simplicity which characterises the letters written in the better period of Roman history. Yet the letters of Symmachus, especially those written to Constantine, which are full of interest, in a manner in which he discharged his duties as prefect of Rome, and also contain the above-mentioned address to the emperors, are of peculiar interest in regard to the history, constitution, and administration of the Roman empire. Many points connected with these subjects, and the history of the Roman law would be entirely unintelligible to us without these letters. Symmachus also distinguished himself as an orator, but his orations are lost, with the exception of a celebrated fragment of one of eight orations of Symmachus in a palimpsest of the Ammonian library at Milan, which he published under the title 'Q. Aurelii Symmachii Octo Orationum ineditarum partes. Invenit notisque declaravit A. Mai.' Mediolani, 1815, 8vo. (Reprinted at Frankfurt, 1816, in 8vo.) Afterwards some other fragments of the orations of Symmachus were discovered in a palimpsest of the Vatican library, which are printed in an appendix to 'Juris Civilis Antejustianianae Re legitum ineditis.' These first seven orations were published with others ones from a MS. now at Turin. They are printed in his 'Annotationes ad Inventarium Bibliothecae Bobbionensis,' p. 182, &c. The style of these orations is on the whole the same as that of the letters, and they are equally valuable as historical documents for the history of the empire during the time of Symmachus.

The first edition of the letters of Symmachus appeared at Strasbourg in 1510, 4to. This edition contains only 317 letters, whereas all the subsequent editions contain 963. A complete edition was published at Basel in 1549, 4to. After this there followed three other important editions: one by Juretus, Paris, 1580, and a second edition, 1604, 4to, with notes; the second by Jac. Lectius, Geneva, 1607, and revised and corrected in 1631, 4to, with corrections on some by Lectius. The third and best edition is that by C. Scioppius, Moguntiae, 1608, 4to. Other editions are that of Philip Pareus, Neapolii Nemeum, 1617 and 1629; reprinted at Frankfurt, 1642, 8vo, and that of Leyden, 1653, in 12mo. 'Symmachii Vita,' by J. Gothofreus, in the edition of Pareus; Heyne, Opusc. Acad., vol. x, p. 15, &c.; J. Gurillit, Systina in Symmachum, Hamburg, 1818, 4to.; Fabricius, BiblioL. Lat., iii, p. 294, &c.; A. Mai, in the introduction to his edition of the works of Symmachus.

Besides the three persons of the name of Symmachus mentioned above, there are several others of the same name who lived about or after the time of the one whose name is in the above list. Q. Aurelius Symmachus was consul in A.D. 330, together with Marcellianus: another of precisely the same name was consul with Anicius, in A.D. 446. Q. Aurelius Memmius Symmachus, perhaps a grandson of the letter-writer and orator Symmachus, was consul in A.D. 465, and was the father of Rusticius, the second bishop of Boethius. (Alcinus Avitus, Epist. 31; Ennius, v. 22.) His grandson Q. Aurelius Anicius Symmachus was consul with Boethius, the son of the great Boethius, in A.D. 522. Besides these there are several Latin writers of the name of Symmachus, of whom however nothing is known: 1. Symmachus, the author of an historical work consisting of several books. Jornsandte, in his work 'De Rebus Gestis' (c. 15, &c.), quotes him, long extracts borrowed from the history of the emperor Maximianus. 2. Several poets of the name of Symmachus: one is simply called Symmachus, another Q. Aurelius Symmachus, and a third L. Aurelius Avianus Symmachus. Several epigrams of these poets are extant.

(Burmarr. Anthol. Lat., ii, 142; H. Mayer, Anthol. Veter. Lat. Epigrammatum et Poesarum, l. p. 102, &c.)

SYMMACHUS, a native of Sardinia, and a deacon, was elected bishop of Rome, by part of the clergy, a.d. 496, after the death of Anastasius II., whilst another part of the clergy, supported by several senators, elected a priest called Lauretius. The matter was referred to Theodoric, king of Italy, who decided in favour of Symmachus. The schism however continued for several years, and in the year 509 the partisans of Laurentius rose in arms, and a great tumult took place at Rome, in which much blood was shed, and the virgins conscripted to God were violated. At last Theodoric came to Rome, and convoked a council, a.d. 502, known in church history by the name of the Symmachian Council, in which Symmachus cleared himself of several charges of licentiousness and rapacity, and was confirmed in his see. Symmachus is said to have condemned the Manichæans, and burnt their books at Rome. He wrote an apologie against the Manichaean, the same time he was retained by the emperor to work for his doctrines, which were put forth by Anastasius L. emperor of the East, and at the same time censured that emperor for the part he had taken in favour of Acacius, the late patriarch of Constantinople, who had opposed the decrees of the council of Chalcedon. Sandum, king of the Ostrogoths, in the war with the Byzantines, in Africa, having exiled to Sardinia several African bishops, Symmachus sent them assistance from Rome. Symmachus also repaired and embellished many churches in Rome, and in the year 516, he was elected bishop of Rome. He died in 514, and was succeeded by Hormidas.

(Platina et Panvinio, Vite dei Pontefici; Bossi, 'Storia d’Italia.')

SYMMETRICAL (Symmetrical). These terms are now applied to order and regularity of any kind, but this is not their mathematical meaning. Euclid first used the word 'symmetrie' or 'symmecry' to signify commensurable, and this well known Latin word is in fact merely the literal translation of the Greek: two magnitudes then said to be symmetrical with each other, meant that they were equal, that is, that one of them could be divided into parts equal to the other. Later, and those comparatively recent, the word was adopted both in geometry and algebra in different senses.

Since symmetrical applies in its etymology to two magnitudes which are equal together (by the same magnitude, the term would, as to other magnitudes, apply to those which may be made to coincide. But the term equal had occupied this ground; and, when, in Euclid, the word equal, which was originally defined in the manner just expressed, had degenerated into signifying equality of area only, the term similar entered to express sameness of form, so that figures having perfect capability of coincidence, or the same both in size and form, were called equal and similar. The word symmetrical therefore not only signified equality, but a relation of equal and similar figures which refers to their position merely, and consists in their corresponding portions being similarly placed on different sides of the same straight line; so that coincidence cannot be produced without turning one figure round that straight line. Suppose for instance the front of a building to be symmetrical: draw a vertical line through the middle of the elevation, and the two lateral portions are equal and similar, as Euclid uses those words. And we shall say that they are symmetrical in equal parts, that the right-hand side stands in the right-hand portion of space, with respect to the dividing line, and in exactly the same manner as the left-hand side stands in the left-hand portion of space. If the architect were to preserve equality and similarity, they would be of equal sizes, or two right sides, to his building, but not one right and one left. In the letter W there is a want of symmetry, but not in Q to make W symmetrical both the inner lines should be thin, and both the outer ones thick.
Euclid assumed the proposition of turning a plane round, so as to apply the faces of two figures to one another, in such manner that, after the application, the spectator must be supposed to see through the paper or other imaginary substance of which his plane is the surface. He has then no occasion to consider symmetry; that is, figures being equal and similar, to show that solid figures consisting of the same number of equal planes, similarly placed, are equal. He seems to imagine that such solids must evidently be capable of being made to occupy the same space, which, though true as to quantity of space, is not true as to the sounds produced. Two solid figures of respect, and yet it may be impossible (and precisely on account of their symmetry) to make one occupy the space previously occupied by the other. The two hands furnish an instance: they give the idea of equality (of size), similarity (of form), and symmetry (of disposition). Yet they cannot be made to occupy the same space, so as for instance to fit exactly the same glove; and a sculptor who should cast both hands from the same mould, would be detected immediately as having got the left hand wrong.

Again, suppose two solids, irregular pyramids for instance, composed of planes similar and equal, each of one to one of the other. Let coincidence be attempted geometrically; the two bases must of course be made to coincide. If then the two vertices fall at the same side of the common base, the figures will coincide altogether; but if the two vertices fall on opposite sides of the bases, absolute coincidence is impossible. Legendre proposed to call such solids by the name of symmetrical, in doing which he introduced the term of common life in an appropriate manner.

In algebra, a function is said to be symmetrical with respect to any two letters when it would undergo no change if these letters were interchanged, or if each were made to take the place of the other. Thus

\[ x^2 + y^2 + ab + b^2 \]

is symmetrical with respect to \( a \) and \( b \); interchange would give

\[ x^2 + y^2 + ba + a^2 \],

the same as before. But this expression is not symmetrical with respect to \( a \) and \( x \), for interchange would here give

\[ a^2 + x^2 + bx + xa \].

An expression is symmetrical with respect to any number of letters when any two of them whatsoever may be interchanged and it remains the same. Thus \( ax + bx + cx + ax + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx \) is symmetrical with respect to \( a, b, \) and \( c \). It is not sufficient that certain contemporaneous changes be practicable without producing alteration: any two of the letters must be interchanged, and the expression remain unchanged. Thus \( a x + b x + c x + a + b + c \) is symmetrical, if \( a \), \( b \), become \( c \), and \( c \) become \( a \), at the same time, but it is not symmetrical: for if \( a \) and \( b \) only be interchanged, it becomes \( b x + a x + c x + c + a + b \), or is altered.

The point to which its is of the utmost consequence in mathematical notation. Here the word means that quantities which in any manner have a common relation should have something common in the symbols of notation; and analogy is perhaps a better word than symmetry. Suppose, for instance, we had an ax for the equation of

\[ ax + bx + cx + ax + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx + cx + bx \],

our formula would have been confused masses of letters, no set of which would have presented any similarity, or have easily remained in the mind. We have a few formulae, where there is no set of formula of which more than one need be remembered; the others must be suggested by it.

SYMMORPHUS, the name given to a new genus of birds by Mr. Gmelin, is an incorrect as to the family in which it should be placed.

Generic Character.—Bill rather short, tumid; the upper mandible slightly notched at the tip; the culmen and commissure subobtuse; the nostrils basal, oval, and nearly hidden; the eyelids small, the tarsus and feet one-third shorter than the second by one-half; third, fourth, and fifth longest and nearly equal. Tail moderate, the external tail-feather on each side shorter than the rest by one-fourth. Tarsi and feet moderate, the former scutellated anteriorly; the posterior to its own is of a shorter than the middle one, the two lateral toes unequal, the inner shortest.

Example, Symmorphus leucopus.

SYMPHONY, the longest term of a musical composition, or the suit of instruments which is employed. SYMPHONIC means, in a musical sense, a concord of sounds; a music made up of every instrument in the orchestra, whether strings, winds, or brasses. SYMPHORIACARPOS (from symphorikos, to bring together, and syngy, fruit), or SYMPHORIA, the name of a genus of plants belonging to the natural order Caprifoliaceae. The tube of the calyx is globose, with a small limb, and 5-toothed; corolla funnel-shaped, 4-lobed; stamens 5; every 4-celled with simple style and semi-aglobose stigma, the fertile cells containing one ovule, sterile ones several; fruit a berry, having 4 cells, 2 of which contain single seeds and 2 are empty. The species are natives of North America. They are elegant, bushy, oppositely-branched shrubs with oval entire leaves, small white or rose-coloured flowers with short pedicels, seated on one or many-flowered peduncles, and furnished with 2 bracts.

S. vulgaris, common. Petals disposed in axillary, fasciated clusters, and seated on very short pedicels. It is a native of Pennsylvania, the Carolinas, and Virginia, in sandy dry districts. It bears red-up-shaped berries, which are about the size of a heapedsp, and ripen in August and September. It grows in woods from 3 to 5 feet, and flowers in August and September.

S. racemosa, Snow-berry: flowers disposed in loose, often leafy, interrupted racemes; corolla bearded internally; stamens and style included. It is a native of North America, and grown in the Missouri and Minnesota, New York, New England, and on the north-west coast at Paget's and Nootka sounds. This is a very handsome shrub, and was introduced into our gardens in 1817, since which time it has become very common. It has rose-coloured flowers, with entire leaves glaucous beneath. The fruit is about the size of a small cherry, and quite white, remaining on the tree after the leaves have dropped off, and giving it a y
beautiful appearance. It throws up very numerous suckers, and on this account may be troublesome in small gardens; but it is a very desirable plant, as bees are very fond of its flowers, and gamed will feed on its berries. It blossoms from July to September.

S. Occidentalis, Wolf-berg, Western St. Peter's-wort: flowers in spikes, dense, terminal, axillary, and drooping; sepals lanceolate-obovate, obtuse, and brownish. It is native of British America, and is abundant about the Saskatchewan and Red River. It is a shrub from 4 to 6 feet high, and has the same general characters as the last, but has not yet been cultivated in Great Britain.

S. glaucocoma, the remaining species, are natives of Mexico. All the species are easily cultivated, and grow in any common garden-soil. They may be best propagated by cuttings, which may be planted in either spring or autumn.

SYMPHYNOTA. [Naiades, vol. xvi, p. 66.]

SYMPTHUM (from συμπτωμα), a name for a plant employed by Pliny and Dioscorides, the name of a genus of plants belonging to the natural order Boraginaceae. It has a 5-parted calyx; a cylindrical-campanulate corolla, the throat of which is furnished with 6 subulate, vaulted processes which convolute to form a cone; 4-1 celled ovate nux fixed at the base of the calyx, imperfect. The species are rough herbaceous plants with broad leaves and terminal tubercles; they are natives chiefly of Europe and Asia.

S. officinalis, common Comfrey: fustiform-branched roots; branched stem, leaves decurrent, the upper ones lanceolate, the bases rather broad, and hairy beneath; limb of the corolla 3-toothed, with the teeth recurved; the anthers twice the length of the filament. It is an inhabitant of the banks of rivers and streams and watery places throughout Europe. 'Comfrey root.' Woodville observes its abounds in mountainous localities like that of the marshmallow; and being more easily obtained, it ought not to be omitted in lists of medicinal plants. Such medicines are useful in irritations of the throat, intestines, and, above all, the bladder. The flowers are of a yellowish-white colour. Around the Mediterranean, the Continent has bluish-purple flowers, red before expansion: it was called by Sibthorp S. patens. S. Bohemianus is also a variety of this species. It has red or reddish-purple flowers.

S. luteus, tuberous-rooted Comfrey: rhizoma oblique, thickened by scales, furnished with short branches; leaves partly deciduous, upper ones elliptical, lower ones ovate; corolla tubulose, funnelling-shapcd, 5-toothed; teeth recurved. This plant is not so stiff and hairy as the last. It is a native of Europe and Asia Minor. Prussia has also been found in Scotland, near Edinburgh, and in Durlston in England. Its flowers are of a yellowish-white colour, and appear in April and May.

S. supravittata, rough Comfrey: stems branched, covered with short hairs; ovate, heart-shaped, pointed, running into petioles, hairy above, striate beneath, upper ones opposite, sessile; calyx tubercled, acute; limb of corolla campanulate. It is a native of the Caucasus and grows on the banks of streams and rivulets. It is a tall plant, very fragrant, with handsome flowers, which are red before expansion, and afterwards blue.

There are several other species. They are all hardy plants, and are well adapted for border-flowers in gardens, for woods and shrubberies, as they will flourish under the shade of trees and shrubs. They will grow in almost any soil, and may be readily increased by dividing their roots in the spring.

SYMPLICYES, Mr. Swinston's name for a subgenus of the genus Symphytum. [Frangullide; Weaver-Brude] SYMPLICTEMOREA. [Foraminifera.] N.B.—M. Dujardin's name for the class is Rhizopoda.

SYMPOLOS (from συμπλως, a knotting together), the name of a genus of plants belonging to the natural order Styracaceae. This genus is given for the type of a natural order, Sympclonem, by D. Don, which contained only one example. It has a 3-parted half-inferior calyx; rotate monopetalous 5-10-parted corolla, imbricate in rotation; included anthers, inserted in the base of the flaments cuspitate at the apex, and polyadphalous at the base; erect anthers bursting longitudinally; 3-5-celled ovary with 4 ovules in each cell. The fruit is a fleshy drupe, containing a 3-5-celled nut; the cells containing but one seed, which has an inercepted embryonic leaf, in albumen, and therefore

The species are trees, having alternate, either entire or serrated, leaves without stipules, and turning yellow in drying. The flowers are axillary, sessile, or peduncled, in short racemes, or a spike, with bractlets at their base. Upwards of 30 species have been described. They all possess an astrigent principle in their leaves, and some are used in dyeing.

S. Alstonia, Alston's Symptoms, is the Alstonia thekeformis of Linnaeus and was named after Charles Alston, president of the botany in the University of Edinburgh. The plant is glabrous in every part, and has shining corticaceous mont- i-ellipsoid or oblong leaves, obtuse, rounded at the base, and obscurely crenate at the apex; small flowers arranged in terminal racemes. It is a native at the Grand, near Santa Fe do Bugado, and Popayan.

S. tinctoria, Dyer's Symptom, Sweet-leaf, Yellow-lea: leaves oblong or lanceolate-ovate, serrated, glaucous, she: per; flowers axillary, 3 or 5, to 10, terminal. This plant is of Honer tinctoria of Linnaeus, and a native of the Continent in the United States of America.

S. racemosa, racemose-flowered Symptom: leaves oblong, glabrous, serrated; flowers arranged in racemes mostly axillary; nut of fruit 1-angled. This plant is named of Hardwad and Michnaep, in Bengal. It is used especially by the natives as a dye, which is of a red colour.

The nuts of S. spotula are very hard, and resemble a nitate fluted pitcher. This plant is a native of Siberia.

In the opinion of some writers they are composed of a mixture of loam, sand, and peat; and are best propagated by cuttings, which grow freely in sand under a glass.

SYMPTOM (ευπτωμα), an incident, or obtrusion of any change in the appearance or functions of the body different from those which occur in health, and perceptible to the senses either of the patient or his physician. Symptom must not be confounded with signs of disease. The observation of symptoms must be made with the greatest care and ingenuity; for no symptoms, but it is by medical reasoning these that we deduce signs. A patient often knows his own symptoms, but is nevertheless ignorant of the disease under which he labours. Some of the most striking symptoms are inferences drawn by the mind from the observation of symptoms. The most striking symptoms often furnish only accessory signs, whilst the most obscure are the signs characteristic of the disease. Visible pain in the head, which frequently attends inflammation of the lungs, but is a symptom of a disease different; bright redness in the skin, or slight pain in the side, or a streak of blood in the expec- ration, furnishes a very valuable sign, and helps to disclose the nature of the affection.

The word symptom has been defined into the essential, which is peculiar to certain diseases, the accidental, produced by some circumstance of unusual occurrence, and the coincident, which are met with alike in various complaints.

That part of medicine which treats of symptoms is called Symptomatology. It was proposed by Bennedec, and is that branch of medical science applied to the investigation of the signs of disease, and of their comparative value.

SYNAGOGUE ( זָנָגָה), a word which primarily signifies a meeting of people, or congregation, but came, like the word 'church,' to be applied, among the Jews, to places where any assemblies, especially those for the worship of God, met, or were convened. In the later Hebrew, such places were called 'תַּחַא יִשָּׁר, house of assembly.' There is no trace of synagogues among the Israelites prior to the Babylonish captivity, nor, in express terms, until a long time after. It is collected however that the origin of such establishments may be referred to that period. Being these assemblies of people for the purpose of prayer, or customary purposes, they were accustomed to assemble on the Sabbath for the better portions of the law read and expounded; and those who ultimately returned from exile kept up this custom in Palestine. (Nehem., viii. 18.) These assemblies or meetings were held in a place specially provided for the purpose, and this order was observed in them. They existed considerably earlier among the Jews settled in foreign parts than in their own country, where we do not find them until the time of the Roman invasion. The ancient synagogues, however, had been originally erected outside the towns, in the fields, usually near waters, for the convenience of the inhabitants; but they were soon introduced into the towns, and were usually established in the principal streets. There were several, and the Jewish writers allude that there were 480
in Jerusalem. The assemblages were at first confined to the Sabbath-days and festivals, but were laterly extended to the second and fifth days of the week (Mondays and Thursdays). The services consisted chiefly in prayer, and in the reading and exposition of the sacred books. At first the readings were confined to the law, but were at length made to comprehend portions of the prophets, psalms, and other books. The whole concluded with a prayer and benediction, to which the congregation responded 'Amen.'

It is the custom for a synagogue not to be opened in any place where ten men could not be found of sufficient leisure to attend to its affairs. Where no separate building existed, a room in some private house was the place of meeting. There are no antient indications that the synagogues had any peculiar form; but each of them had a kind of altar or table, at which the volume of the law was read; and at the east end was an ark or chest in which that volume was kept. The seats were so disposed that the face of the worshipper was towards this sacred repository and towards the elders, who alone sat with their backs to the ark, and their faces to the people. The synagogues were used not only for worship, but for holding local courts of justice, which had cognisance of petty offences requiring no higher punishment than stripes, which were inflicted in the open spot. (Matt. x. 17; Luke, xii. 11; Acts, xxii. 19.) The affairs of the synagogue were under the direction of several officers: the chief of them was the archisynagouge (ἀρχισυναγώγος), or 'ruler of the synagogue,' who regulated its affairs, and without whose leave no one could preach or read. (Mark, v. 22; Luke, xii. 14.) Next to him was the officer called Ἀγιασθενος (Sheiach tabbor) or 'angel (messenger) of the church,' who prayed in behalf of the congregation. The Ἠγεσία ('Chazan,' who is the reader in modern synagogues, appears to have been the 'minister' (Luke, iv. 20) who had charge of the sacred books. As it appears from Acts, xiii. 15, that there were several archisynagogi, it is probable that they answered to the committees of elders, by whom the synagogues are at the present time managed.

With some necessary modifications, the antient usages are still maintained in the modern synagogues. The highest ground that can be conveniently appropriated is still chosen for the site of a synagogue. In this part of the world it extends east and west, with the entrance, or principal entrance, in the west, that as the people enter, and as they sit, their faces may be turned towards the land of Canaan. The altar or desk is on a raised platform surrounded by a wooden rail, and large enough to contain several persons: the women do not mingle with the men, but have a separate part or gallery (if there be one), where a wooden lattice screens them from observation. The men keep their heads covered in the synagogues. The first synagogue in England of which we have historical knowledge is that which, in the reign of William Rufus, existed at Oxford, where the Jews were then numerous; but it is likely that they had one then or before in London also, as the fact that their only burial-place in England was in the spot now called Jew Street, indicates that this was their principal seat. Early in the reign of Henry III. the Jews ventured to build in London a synagogue, which surpassed all the churches of that city in stateliness; and this occasioned their being taken from them, and consecrated to the Blessed Virgin. Later in the same reign they lost another synagogue, which they had erected in the Old Jewry, on the complaint of the Friars Prentent in the neighbourhood, that they could not consecrate the elements in quiet on account of their 'bowling.' So late as the reign of George II. the only synagogues allowed in England were the two in London, one for the Portuguese Jews in Bevis Marks, and the other for the German Jews, in Duke's Place. But this restriction has long been withdrawn, and there are now seven or eight synagogues in London, and one in most of the seaport towns.

(Virings, De Synagoga and Archisynagog; Lewis, Origines Hebrew; Tovey's Anglia Judaica; Allen's Modern Judaism.)

SYNALLAXIS, M. Veniloto's name for a genus of birds, placed by Mr. Swainson in the family of Certhiade.

Generic Character.—Bill short, rather strong, straight; both mandibles of equal thickness, entire, and much compressed; the margins of the upper mandible inflected beyond the nostrils. Frontal feathers rather rigid. Wings very short, and much rounded; the primaries scarcely exceed the tertiaries. Tail broad, more or less lengthened, and either graduated or cunened; the webs soft and loose, but the shafts rather rigid; the tips lanceolate. Feet very large. Tarsus lengthened. Middle toe longer than the hinder; lateral toes equal. Claws slender, acute, and but slightly curved; the three anterior rather small. (Sw.)

Example, Synallaxis garrulus. Description.—Brown, beneath whitish, feathers on the front of the head rigid, pointed, and rufous; lines before and behind the eye whitish; tail moderate, rounded. Habits, &c.—Mr. Swainson, whose description this is, has given a very good figure of this bird under the name of Maturus garrulus, in the first series of his Zoological Illustrations. It is remarkable, he observes, for its very singular nest, which is so large as to form a feature in the woodland scenery of Bahia, the only part of Brazil where he observed it. He describes the nest as built in low trees, formed externally of dried sticks, without any neatness, usually three or four feet long, and resembling at a distance a thick twist of bean-stalks thrown in the branches by accident. Sometimes, he says, two or these nests appear as if joined together, and there is an opening on the side, besides one at the top. He further states that the sexes are generally seen near the nest, uttering a shrill, incessant, monotonous chirp, particularly in the morning and evening; adding (and we respect him for it) that he never could bring himself to tear one of these nests to pieces, merely for the purpose of seeing its construction.
SYNCELLUS (συνκέλλος), a Greek word equivalent to consanguineus in Latin; and meaning a person who inhabits the same chamber (cella) with another, was used by the Christians of the early and middle ages as the name of an ecclesiastical dignity. The Syncellus was constantly with the patriarch, metropolitan, or bishop, as an inspector of his life and manners. The successors to the patriarchs and metropolitans were very often chosen from the Syncelli. Their rank was very high, and at one time they even claimed precedence over the metropolitans. Their number was considered, till by a constitution of Heraclius the greatest number allowed in one church was two.

The chief of the Syncelli was called Protosyncellus (πρωτοσυνκέλλος), and the president of their assemblies was called πρωτοσυνκέλλος.

The suffragan bishops [Bishop] were also called Syncelli. (Du Cange, Glossar. Med. et Inf. Latin., s. v. 'Syncellus: Glossar. Med. et Inf. Grammat., s. v. Συνκέλλος.)

SYNCELLUS, GEORGE, (Γεώργιος Συνκέλλος) was a monk and abbot at the end of the eighth and the beginning of the ninth century after Christ. His surname was given him from his being the Syncellus of Tarassius, patriarch of Constantinople, who died in the year 806 A.D. George Syncellus died about the year 900.

His 'Chronography' (ξενοκρατησεως) is a history of the world, arranged in chronological order, from the creation to the reign of Diocletian. The intention of the writer was to include the whole period down to 800 A.D. It is a little more than a copy of the 'Chronicon' of Eusebius.

It was published from a MS. in the royal library at Paris, which was obtained at Corinth in 1507, by J. Goar, in a folio volume, containing the Greek text, a Latin version, and notes, together with the 'Breviary' of Nicephorus, Paris, 1652, reprinted at Venice, 1729. It is also contained in the Bonn collection of the Byzantine writers, in which it forms, with 'Nicephorus,' two volumes, edited by W. Dimor, from two important MSS. at Paris, 1829. The Chronography of Syncellus was continued by Theodore Philemon from 825 to 813 A.D. Among the MSS. of the Royal Library at Paris are fragments of some of the historical works ascribed to Synellus.

SYNCOPE in Music is, when the first half of a note begins on the unsounded or weak part of a bar, and the other half is continued and terminates on the accented or strong part. [Accent, in Music. Example—]

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SYNCOPE (συνκόπη), literally a cutting in pieces, a sudden failure of power or strength, fainting. A sudden impairment or complete loss of sensation and voluntary motion, with great diminution or almost total abolition of the heart's action and of the function of respiration.

Fainting sometimes occurs quite suddenly, but is usually caused by certain premonitory symptoms. These are a sense of languor and unsteadiness, confusion of the mind, oppression at the breast, dizziness of sight, ringing in the ears, partial cold sweats, paleness of the face, and coldness of the extremities. The symptoms continue for some time, and for a time pass away, or are followed by swooning, a state of complete faintness, during which the pulse is altogether imperceptible at the wrist, and respiration nearly ceases. When a fainting fit comes on suddenly and without any warning, it is usually more prolonged than when it has been preceded by the symptoms just enumerated. Recovery from fainting is frequently attended with palpitation of the heart, and sensations more distressing than those which ushered in the fainting fit. The duration of a fainting fit seldom exceeds a few minutes or even seconds, but instances are on record of persons continuing in a swoon for many hours.

The immediate cause of fainting is in all instances some interruption to the due transmission of blood to the brain. Various circumstances however, both mental and physical, interfere with the circulation, either through the medium of the nervous system, or by acting directly on the heart itself. Persons swoon from any violent and sudden mental emotion, as terror, grief, disappointment, or even excessive joy. The tumult of the veins and arteries produces a blood wall or else it is that several occasions some persons to faint, as do various impressions on the senses, whether painful or otherwise. Very susceptible individuals have been known to faint on perceiving the colour of certain flowers, and unpleasant smells still more frequently cause faintness. Long watches and over exertion, blows on the pit of the stomach, swinging, and rotary motions are some among many of the conditions which occasion fainting by their action on the nervous system. The sudden injection of a large quantity of blood probably has a more immediate action on the heart; and to the disturbance of the circulation must be attributed those fainting fits which sometimes occur in the course of disease of the heart. The sudden transition from a horizontal to a sitting posture when persons are very weak or have lost a large quantity of blood probably acts in both ways at once; and fainting sometimes takes place from other causes, such as heated rooms, &c., of which we cannot well explain the action.

Fainting may be confounded with apoplexy or asphyxia; and if it continues for an unusually long time, the person may be supposed to be dead. A little attention however will prevent our mistaking an apoplectic person, who breathes loudly and with a sobbing noise, for a person in a swoon, whose respiration is gentle, and almost imperceptible, and whose pulse either cannot be felt at all, or is at any rate extremely weak. Asphyxia is a state of suspended animation, brought on by some cause interfering directly with respiration, and is marked by tenuity of pulse and by the while the face of a person in a fainting-fit is pale and sunken. The continuance of respiration and of the heart's action, though very feeble, the temperature of the body, and the absence of all stiffness of the limbs, would sufficiently distinguish syncope from death; but it must be very unusual for fainting to continue for a few minutes without there appearing some evident sign of life.

In the treatment of a person who has fainted, the first point is to place him in the recumbent posture, and in the case of fainting after blood-letting, nothing more is in general required. Exposure to the cool air, sprinkling cold water on the face, and friction of the limbs, may be employed if the fit continues; and a small quantity of water or sal volatile may be given as soon as the patient is able to take it. The horizontal posture should be preserved until recovery is complete.

For the prevention of fainting fits in those who are subject to their frequent recurrence, various treatment must be necessary, according to the nature of the cause producing them. Slight fainting fits recurring frequently are a common forerunner of epilepsy.

SYNDACTYLES, or SYNDACTYLCOUS BIRDS, a group of birds having those birds which have the toes too nearly as long as the middle one, and united to it as far as the penultimate articulation. This group contains the
SYNDIC comes from the Greek 'syndikos' (σύνδικος). The Greek word Syndikos originally signified one who aided another in a matter by a court of justice and hence came to be used as an advocate who represented another's cause before a court of justice. Syndics also signified at Athens one who was appointed by the state to attend to its interests in any matter in dispute between Athens and her Allies. They were elected by the Syndics by the Athenians in a matter relating to the temple at Delos. (Demosthen. Ipsi Σημαίνεις, c. 42.) There were also functionaries at Athens called Syndeci, who were appointed, after the establishment of the tyranny of Philopoemen, by Eratosthenes. (Pausan, v. 18.) The word Syndicus passed into the Latin language. It often occurs in the 'Digest' in the sense of an attorney or agent for a university or corporate body: in this sense it is used as synonymous with Actor by Gais. (Dig. 3, tit. 4, s. 1.) In the middle ages also the word Syndicus was in common use, and was frequently given to the agent or factor appointed by corporate bodies to manage their common affairs, and especially to represent them in courts of law. This was probably from a Latinized form of the name of Lords Syndics, who had obtained permission from Pope Innocent III. to appoint an officer for such purposes with this name. (Bulaei Hist. Univ. Paris, ii. 33; Crevier, Hist. de l'Univ. de Paris, l. 184.) Crevier, in his Dissertation on the various places and institutions concerning a Professor of the faculty of arts, by the equivalent names of procurator, agent, greffier (iii. 230; iv. 369: v. 429). In the same sense most of the other corporate bodies in Paris and other French towns used to have their syndics. The word Syndicus was almost as usual applied to the solicitor to the community, or town-clerk, in the towns of Languedoc and Provence. The clergy, in like manner, had their Syndiques Généraux, Syndiques Dioecesiens, and Syndics Provinciaux; and Syndics, or agents resident at Paris, were known as Syndics de France (Scindicus, and Ricbelet, ad verb.).

The functions of the different syndics however varied considerably; some were mere agents or solicitors, others were representatives of their corporations in a higher degree, as registrars, registrars of the office of Syndics, and deciders of causes, instead of merely conducting them. The syndics in some places were much the same description of functionaries that were elsewhere called Scabinii or Echevins, a species of town-councillors or magistrates employed by the communes to transact business and regulate the administration of the town. The magistrates were elected every year to manage the public affairs of the city, who were designated Syndici de Guerra. (Ducange, Gloss. Med. et Infm. Lat., ad verb.) The four chief magistrates of the city of Geneva, also annually elected, are known by the same name. In Paris, beside the Syndic, there were the Syndiques or syndics of the different guilds or corporations of the city. For the signification of the various old words derived from or connected with Syndicus (otherwise Sinicus, Sinicis, Scinconius, Scindicus, Sinicis), such as Syndicar, Syndecar, Syndicamentum, Syndicus, they are, of course, Subsynicis, Synicar, of which the modern term 'syndicate' is a contraction. For the same reason the same thing was given to the term Syndic, which is said to have been known at the head of an embassy to Constantinople, to procure a golden crown to the emperor Arcadius, to whom he addressed a very suitable oration, which is still extant. At this period he was a heathen, but he was soon after converted to Christianity and baptized by Theophilus, bishop of Alexandria. He still however retained his fondness for the New Platonic philosophy; and partly for this reason, and partly from universal respect for his rank and long desired the title of Theophilus to consecrate him to a bishopric. At last he yielded, and became bishop of Ptolemais, in the year 410. The title of his death is not known, but it was probably before 431, since in this year his brother Euopus appeared at the council of Ephesus, as his successor in the bishopric of Ptolemais.

Syneusis was one of the most remarkable men of his age, though certainly more eminently as a philosopher than as a churchman. His translation of Plato's 'Republic' was in a place where it was rising to eloquence. With a peculiarly clear statement of the most abstract philosophical opinions, he mingled interesting illustrations from the early historians, fabulists, and poets.

The following are his chief works:—1. 'The Oration to Arcadius, mentioned above, 'On Royalty' (σεβασμος). 2. 'Don, or on Self-discipline' (Αγυια, ή περι τας καλας ἀνυπηρετικες. 3. 'The Frame of Baldwin' (ταμασμος τυχεματος). 4. 'Christian Education' (Χριστιανικος σχολος). 5. 'An Egyptian Fable, or, On Forethought' (Αλϕατρος, ή περι προνοιας), an application of the fable of Oarias and Typhon to the then state of the Roman empire. 6. 'On Dreams' (σεβασμος). 7. 'A Discourse on the Causes of War' (Επιστολα του Αλκεδονου).

The present was an astrobule, and the discourse recommended the study of astronomy. 7. One hundred and fifty-five letters. Some of these letters are free and interesting epistles to his friends, and others, on matters of business, contain much information of great value to the church historian. 8. 'Ten Hymns,' formed of a most singing mixture of Christian truths, poetic images, and New Platonic dreams. 9. Four epigrams in the 'Greek Anthology' are assigned to Syneusis.

A complete edition of the works of Syneusis, in Greek and Latin, was published by Petrua, Paris, 1612, fol, reprinted in 1631, 1633, and 1640. There are several later editions of portions of works.

(Fabriæus, Bibl. Grææ, vi. p. 221, old edition; ix, p. 198, Harles; Scholli, Geschichete der Griech. Lit., iii. p. 365.)

There was another philosopher of the same name, of whom nothing more is known than that he translated a commentary on Democritus, which is printed in Fabriæus, Bibliotheca Graeca, vol. viii. p. 233, old edition.

Scholli, iii. p. 445.)

SYNEUSIS (Σωτηρων), a Greek medical writer, of whom nothing is known, wrote that a treatise on Fever goes under his name: his date also is rather uncertain. Sprengel places him in the reign of the emperor Manuel (A.D. 1143-1180), apparently because he supposed the Zadu 'I-Mode' or 'Visticum Perigrinatum,' of Abu Jafer Ahmed Ben Ibrahim Ben Abud Chalid Ibn 'I-Jezaar, to have been written at the end of the eleventh century after Christ. As however Ibn 'I-Jezaar died about the year (A.H. 395) A.D. 1094 (Wustenfeld, Gesch. der Arab. Arztl. Götting, 1840), we must translate into Greek, under the title 'Επιστολα του Αλκεδονου, may have lived much earlier than Sprengel places him; and this is the more probable if it be true that his translation was of service which died almost with him, as the editor, Handl, der Bücherh., für die ältere Medizin, Leipzig, 1841, in composing his 'Visticum Perigrinatum.' The treatise of Syneusis is apparently part of his translation of Ibn 'I-Jezaar's work, the whole of which, in seven books, is said to have been translated into the Arabic, and is still preserved in the royal library at Paris. Reiske compared it with the original Arabic, and found it a very exact translation, with some few exceptions, as, for instance, in p. 136, where Syneusis has made some improvements in the text. The translations we find the Arabic word added to its translation in Greek characters, viz. p. 76, λιβρικ αναιρηθα, weim; and p. 120, δεμαλιθητε, ut malalithethi, a tertian fever. Sprengel remarks (Hist. de la Med.): that his theory of fever is taken from the 'Ibn 'I-Jezaar, from which it was derived by continual grief are well described (p. 30): but proves also of his moral treatment of febrile affections (58).

The means of cure mentioned by Syneusis are in
S Y N

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synonymy with the habits and natural productions of Arabia.
He constantly recommends water, sugar, and oil of roses; his purgative remedies are prunes, myrobolans, and cassia; he exhibits croup internally (p. 240). The most curious part of the work is the description of the small-pox, which he calls φλοξταυρον λογισμον, and which he distinguishes from the measles, or ψραν λευκος και τωνυ μολισμον. Synesius, the first Greek author who notices these two diseases; but all the details that he mentions concerning them are taken from the treatise by Rhazes on the same subject. [Rhazes.] The work was edited by J. St. Bernard, Amstel. and Ludg. Bat. 8vo, 1749, with the title, 'Synopsis Philoponiana, quae nonnulla primum ex Codice M. Biblioth. Lugd. Batav. edidit, viribus, notissime illuminat J. S. B.; accedit Viciatici, Constantinio Africano Interprete, libri vi, pars.' The six first chapters are inserted in the Venice collection of 1576. [De Ferberus, 1576, fol.]; the two last are in the first volume of the Opera of Constantinus Afer, Basal, 1536, fol.

SYNTHETEES, or SYNATHEREES. [Porcupines, vol. xvi., p. 416.]

SYNRIUM, Savigny's name for a subgenus of owls. Example, Syrniuin Almo, the well-known brown owl, tawny-owl, ivy-owl, or wood-owl of these islands. [Stragier.]

SYNGATHEA, according to Dr. Leach, the second order of the class Myriapoda, comprising the species of that class which were by Linnaeus included under the head Scolopendra.

This order is divided by Latreille into two sections: the species of the first have only fifteen pairs of legs; and belong to the tribe Scolopendrinae, the second segment, is considered by Linnaeus and other authors, when viewed from beneath. In the second section there are at least twenty-one pairs of legs, and the segments are of the same size and number both above and beneath. Dr. Leach divides the present order into two sections or families, to which he applies the names Scolopendridae and Geophilidae, which he characterizes as follows:—the first (Scolopendridae), by having each segment of the body provided with two legs, and the hinder legs distinctly longer than the others. This family belongs to the forficata of Linnaeus, a species found commonly under stones, &c. in this country and other parts of Europe. According to the author last mentioned, this species constitutes the type of his genus Lithobus, distinguished by the antennae being composed of forty or more joints, the two first of which are the largest; the under lip is broadly notched in front, and has the margin much dilated; the eyes are granulated; the legs are fifteen on each side. The genus Crayton of Leach, of which a species (C. horntene) is found in gardens in Devonshire, has about seventeen joints to the antennae; the under lip is not dilated, and it is scarcely margined in front; the legs are twenty-six on each side, and the first joint of the hinder legs is spinous; the body is indistinct.

In the family Geophilidae the legs are very numerous, and the hinder legs are not distinctly longer than the others. The species of the genus Geophilus (Leach) have upwards of forty legs, the antennae have fourteen joints. Several species are found in England; they live in the ground and under stones. The Scolopendra electrica of Linnaeus belongs to this genus.

SYNOD, a Greek word, σύνοδος (literally, 'a coming together'), adopted by the Saxons, sometimes used for an assembly of any kind, but much more commonly for an assembly gathered for ecclesiastical purposes, and more particularly for an assembly of bishops or presbyters depited by various churches or branches of the universal church to meet at an appointed place, there to deliberate on points of doctrine or other matters relating to the regulation and welfare of the church. These synods are also called councils.

In the history of the church we meet with many councils; but some are of far higher dignity and consequence than others. The highest are those which were held in the early centuries of the church, and have been approved and termed orthodox, as the whole body of professing Christians. Of these there have been only six. Some however of the councils of inferior authority are regarded as ecumenical by certain portions of the church.

By ecumenical is meant, representative of all the different Christian churches established throughout the habitable world (οικουμενη). It is not however implied thereby that bishops from all Christian sees must be present at a synod in order to constitute it ecumenical, for the whole body of bishops were never present at any council held; but if the Christian world consent then or afterwards to its decree, its ecumenicity is considered as established.

The Apostolical council held at Jerusalem on the question of the legal necessity of circumcising gentiles as a mark of the kind of Scripture authority for such assemblies. All the Apostles were not there, but their decisions were admitted by the body of Christians generally.

The six ecumenical councils are the following, and it is commonly understood that since the Apostolic Council these are the only councils whose decrees have generally been admitted by the church:—1, the Synod of 318 bishops in Bithynia, A.D. 325; 2, the Synod of 150 bishops at Constantinople, A.D. 381; 3, the Synod of 7 bishops at Bruges, A.D. 539; 4, the Synod of 639 bishops at Chalcedon, A.D. 451; 5, the Synod of 165 bishops at Constantinople, A.D. 553; 6, the Synod of 170 bishops at Constantinople, A.D. 686. The Eastern church regards another Synod as ecumenical, that at Nice, under Irene, A.D. 776; and the Western (Roman Catholic) church contends that several others are entitled to be so regarded, but it is not agreed what is the number.

The Protestant churches admit of the first four only as being ecumenical: but they virtually include the fifth and sixth as supplementary to the third and fourth, and not condemning any new heresies.

A brief notice of each of the six great councils follows:—

(1) The Synod of Nice, A.D. 325, was assembled in order to determine the Arián controversy. By its decree it anathematized the doctrine of Arius. This decree was generally approved, and confirmed by subsequent councils.

(2) The first council of Constantinople. This was assembled by the emperor Theodosius the Elder, to appease the troubles of the East. It anathematized the heresy of Macedonius, who denied the divinity of the Holy Ghost. Its decree was sanctioned by the subsequent synod of Chalcedon.

(3) The Council of Ephesus was assembled by Theodosius the younger, to determine the controversy raised by Nestorius, bishop of Constantinople, who declined against the title of coequal, which Christians had long applied to the mother of Jesus Christ. The Nestorian doctrine was condemned by the Council of Ephesus, whose judgment was subsequently confirmed, like that of the first Constantinopolitan synod, by

(4) The Council of Chalcedon, which was assembled by the emperor Marcian. Besides ratifying the creeds of the three preceding councils, it condemned the Eutychian or Monophysite heresy, namely that which maintained that there was only one nature in Christ after the Incarnation. Some of the churches in Egypt and Palestine retained the Eutychian heresy notwithstanding.

(5) The Second Council of Constantinople was assembled by Justinian. It condemned certain writings which favoured the Nestorian opinions.

(6) The Third Council of Constantinople was assembled by the emperor Constantine Pogonatus, to terminate the divisions caused by the dogmas of the Monotheists, who hold that the union of Christ's divine and human nature, there remained in him but one will and operation. In its decree condemnatory of this error, the synod published a definition of the faith, in which they acknowledged the five preceding ecumenical councils.

Of the other more remarkable councils, the following brief tabular statement may suffice:

<table>
<thead>
<tr>
<th>Place of Assembly</th>
<th>A.D.</th>
<th>By whom held</th>
<th>Decree, Synod and Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandria</td>
<td>347</td>
<td>Constans and Constantius</td>
<td>Re-established in the sees the bishops who had been deposed and exiled.</td>
</tr>
<tr>
<td>Ariminum</td>
<td>360</td>
<td>Constantius</td>
<td>Altered the wording of the Nestorian creed at the invitation of the Arians.</td>
</tr>
</tbody>
</table>
SYNONIC, SYNONIC REVOLUTION (césaroc, conjunction of paths). The synodic revolution of two bodies which move round a common centre is that portion of one or more actual revolutions in which they go through all their possible relative positions. The simplest instance which can be given is that of the two hands of a watch: the absolute revolution of the minute hand is made in one hour, that of the hour hand in twelve hours; but the synodic revolution of the two hands is the interval which elapses between any time at which they are together, and the next time at which the same thing takes place.

Every phenomenon which depends upon the relative position of two revolving bodies cannot complete all its phases in less than a synodic revolution. Thus, in the case of the sun and moon, the total disappearance of the latter which takes place when they are nearest in the heavens, cannot take place again until they are again at their nearest, that is, until the moon has not only completed the circuit of the heavens, but has returned to the same place from which she overtook the sun. The actual revolution of the moon is not an object of interest, except to those who watch her progress among the fixed stars: the phases which are visible to all the world depend solely on her motion relative to that of the sun. Those who would make a common watch tell time in a manner resembling the indications of luni-solar phenomena must rub out the marks of minutes and hours from the dial-plate, and choose for an interval of measurement that which elapses between successive conjunctions of the minute and hour hands.

If the two revolutions be made in the same direction, and if \( T \) and \( t \) be their respective times, \( T \) being the greater, the time of the synodic revolution is

\[
T' = T - t
\]

For, if \( x \) be the time of a synodic revolution, the portion of an actual revolution which the quicker has gained upon the slower is

\[
x = \frac{x}{x - t}
\]

but by hypothesis this is a whole revolution, since the synodic period is nothing but the time in which the quicker gains a whole revolution upon the slower. Equate the last formula to unity, and the resulting value of \( x \) is the first formula. But if the two revolutions be made in opposite directions, the synodic revolution is made in the time

\[
T' = T + t
\]

Thus in the case of the hands of a watch, \( T' = 12h \), \( t = 1h \); and if of an hour or \( 24h \), is the interval of two conjunctions of the two hands.

To find roughly the synodic period of the sun and moon, let us take the sun's actual revolution at 365 days, and the moon at 27\( \frac{1}{2} \) days. We have then

\[
365 \times 27\frac{1}{2} = 994 \text{ days nearly.}
\]

SYNOICUM, a genus of Asidiacean, thus defined by M. de Blainville—

*Genera Character.*—Body more or less cylinndrical, vertical, or horizontal, adhering by the cephalic extremity, and united together by the sides of their external envelope, so as to constitute a whole mass, which in the case of perfect and fixed; the two apertures of each composing animal hidden at the bottom of a more or less deep cavity, and having only a single external orifice, furnished ordinarily with six tentacle-shaped papilae.

M. de Blainville thus divides the genus:—

A. Species united into a convex rounded mass. (Pulmonella, L.; Apodium, Salt.)

Example, Synoicum Ficust.

B. Species in which the horizontal bodies unite together in a mamillated crust.

Example, Synoicum subgelatinosum.

C. Species in which the vertical bodies also unite together in a crust. (Didermum, Salt.)

Example, Synoicum fimbriatum.

D. Species in which the very long vertical bodies unite...
together in a species of cylinders, having only a single external orifice common to all the individuals.

Syrnucom Pius, a, a portion highly magnified.

SYNOVIA, or joint-oil, is the name applied to the fluid by which the joints of the bodies of animals are lubricated. It is separated from the blood which circulates in the vessels immediately surrounding the joint. These form a very close capillary network in the tissue which bounds the joint, and which, when it can be separated in a distinct layer, is termed the synovial membrane. [ARTICULATION] Synovia is a pale yellow viscous fluid, which, when rubbed between the fingers, is peculiarly slippery, and of any degree oily. In the horse, it was found by John (whose analysis is confirmed by those of several other observers) to consist of

Water . . . . 
Albu'men . . . 64
Univalent animal matter, with carbonate
and hydro-chlorate of soda . . . . . 06
Phosphate of lime . . . . 015
Traces of ammoniacal salts and of phosphate of soda . . . . . . . . . 05

100

Its quantity is in direct proportion to the size of the joint, and is always sufficient to keep the articular surfaces smooth and slippery, and to fill up those recesses in the joint into which the adjacent soft tissues do not exactly fit.

SYNTHESES [SYSTEM, PTOLEMAIC]

SYNTHESA. [SILHET.]

SYNTHESES (συνένσω and thenc, putting together). In the article ANALYSIS we have stated the manner in which the terms synthesis and analysis are usually applied in the mathematical language: the following remarks on the connexion of these terms will not be out of place in the present article.

Synthesis teaches by construction; analysis, by the undoing, as it were, the parts of a previous construction. If the construction of a watch were actually shown, and its capability to fulfil the object of the maker inferred from the consideration of the necessary connexion of the parts (not merely proved by experiment from the going), this would be a synthesis. Again: if the actual performance of the machine having been first contemplated, its structure were then to be examined, by pulling it gradually to pieces, and properly inferring the effect of each removal, this would be an analytical examination.

We doubt very much whether an analysis or pure synthesis exists in large quantities in an unmixed state in any science whatsoever. The chemist, for example, may apply the terms technically, and so far properly enough, to actual chemical processes, but it must be remembered that analysis, as such, is not a science, but a mode of thought; and that in order to make a true comparison of the processes of the chemical and the mathematical sciences, the latter must be understood in its abstract sense, and the former with that of a natural science.

In the exact sciences there is something like analysis, but much intermingled with synthetical processes. M. Charles (Encyc. Meth., 'Synthése') says there is hardly a such a thing as an analysis, properly so called, in mathematics; and, using the word analysis in the strict sense, we should agree with him, and add that, except for learners, there is as little of pure synthesis. Generalization and abstraction, the application of that which has been found effective in the sciences to all other cases of the genus, and the separation of the whole of the analysis which appears at first peculiar, but on further examination turns out to be only peculiar because a mode of thought capable of wide application has been incidentally mixed up with the particular which are essential to the problem in question— are two of the most powerful instruments of mathematics. But to which do these belong, to synthesis or to analysis? If every separation of ideas be analysis, the application of that which has been found effective in the exact sciences, are not even the most prominent ones. When Newton, having discovered the law of the binomial theorem for positive integers, proceeded to try and verify the application of that law to fractions, it would be hard to make his process either analytical or synthetical, or a compound of
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but, except by such extension of the terms as would destroy their distinctive use. Under the general notion that all inquiry which proceeds in a reverse order is analysis, and that all which may be dignified by that name is sound mathematical reasoning, much fallacy has been introduced into the elements of mathematics, the effects of which are only beginning to disappear. The work of A. L. Nightingale's, who proceeds to separate the known from the unknown, or in any manner to make that which is unknown capable of being compared with the known; the result when obtained is the solution of the problem: such is the language held. But it was forgotten that the assumption of the possibility of solving the problem was an assumption; and that the conclusion should have been, not 'This is the solution of the problem,' but 'If the problem have a solution, it must be the integer larger of the two determined by my process.' To pose a beginner in algebra, with a competent knowledge of arithmetic, and without any absurd pre-definition of negative quantities, has the following question proposed: 'Given $3x-11=5x-15$; required the value of $x.$' He is told to proceed thus:

Let $3x-11=5x-15$
Add $2x$ to both sides $11x-15=3x$
or $x=2$

Therefore $x=2$ is the value required.

Now the fact is, that the equation proposed is impossible to a student who has never been a solution, it is $x=2$; but when he is told to try whether $x=2$ is a solution, he finds $5x-11=0$, an operation which cannot be performed, at the first step. Of the same nature is the assumption which was till lately part of most proofs of theorems: that the method can always be expanded in integer powers of $x$: and the consequence was that most works on the differential calculus were defaced by a subsequent admission that a proposition previously declared universal was not universal; and students received a philosophical caustic to append errors excepted to every Q. E. D.

As these blots are gradually removed, so does the surface of the higher mathematics become more and more synthetical in all its elementary parts. Gradually generalizing, he opens the road of analysis in the antient sense: when the student has step by step arrived at the power of comprehending that view of algebra which defines or interprets $-1$ and $\sqrt{-1}$ with rigor, he can then set out with the theorem that every equation has a root, he could be deflected in the same manner, when the complete meaning of a differential co-efficient (for every index of differentiation) is fully settled, such preliminaries may be obtainable as will enable the higher student to give full and true meaning on such a form of expansion as will not afterwards fail.

In the meanwhile there is a view of the higher mathematics, which will render the common term analytik, as applied to them, appropriate enough. The farther we proceed the greater is the power of taking out the reverse process in which analysis was defined to consist from the domain of the hypothetical syllogism, and placing it in that of rigorous deduction: the consequent increase of the power of pure analysis, or at least of that proceeding which most resembles it, may suggest the notation of the term as descriptive at least of the ultimate tendency of all progress, though not of a result as yet entirely obtained.

SYNTHAPs. This is the title of a collection of synonyms in an Indian language, made by the father of Andreopolis, but the collection is evidently translated from an Oriental work. It is hardly necessary to remark that the Eastern collections of moral stories are usually told so as to grow one out of the other, in a manner of which we have an instance in the 'Arabian Nights,' but a much better example in a work not so popularly known, the English translation of the fables commonly known as those of Pilpay. It is, perhaps, not so generally known, however, that many of our best European fictions, as were the stories of Pilpay, were collected from one source: from Europe to Arabia, and from Arabia to India, and that the Indian form of the story or collection almost invariably bears the marks of an earlier origin than any other form that we have. We have in the 'Arabian Nights,' the oldest surviving one. This fact, interesting in itself, becomes doubly so when taken in connection with the philosophical discoveries of the latest period of etymological research; discoveries which have placed the language of India in much better relation to the language of the German, as we have supposed the fictitious literature of India to hold to that of Europe. Many of the stories of Synthap are found almost verbatim in an Arabic manuscript of the 'Arabian Nights,' in the British Museum, but the whole style of the stories points evidently to an Indian origin.

Synthap is the name of a philosopher to whom is committed the education of a certain Persian prince, the son of Shah Cyrus. When the prince was six months old he had learned from his master that he was the boy more in six months than he had learnt from his other masters in as many years; but at the time when the king wishes in person to prove the acquirements of his son, the preceptor discovers by his skill in astrology that a great disaster is impending, which will throw the silence of the latter during seven days. The king and his courtiers are naturally much perplexed by this unlooked-for event, and many ingenious guesses are wasted as to the cause; at last one of the king's wives understands that the prince has indeed been there, but that he has in nowise injured the field, and that he will not return to it again. The same counceller tells the story of the parrot set by its master to watch his wife and report to him her conduct during his absence. The informer comes before him and, receiving the visits of a lover; but on a subsequent evening the woman, by pouring water over his cage, and counterfeiting the noise of thunder, induces him to report to his master that a violent storm had broken out his cage and that a parrot is floundering in the field, and who had suffered it to lie waste. Following up the metaphor, the husband assigns the reason of his conduct, that he has seen the foot-prints of a lion in his ground. The king acknowledges that the lion has indeed been there, but that he has in nowise injured the field, and that he will not return to it again. The same counsellor tells the story of the parrot set by its master to watch his wife and report to him her conduct during his absence. The informer comes before him and, receiving the visits of a lover; but on a subsequent evening the woman, by pouring water over his cage, and counterfeiting the noise of thunder, induces him to report to his master that a violent storm had broken out his cage and that a parrot is floundering in the field, and who had suffered it to lie waste. Following up the metaphor, the husband assigns the reason of his conduct, that he has seen the foot-prints of a lion in his ground. The king acknowledges that the lion has indeed been there, but that he has in nowise injured the field, and that he will not return to it again. The same counsellor tells the story of the parrot set by its master to watch his wife and report to him her conduct during his absence. The informer comes before him and, receiving the visits of a lover; but on a subsequent evening the woman, by pouring water over his cage, and counterfeiting the noise of thunder, induces him to report to his master that a violent storm had broken out his cage and that a parrot is floundering in the field, and who had suffered it to lie waste.
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(There is an Arabic proverb which alludes to a similar catastrophe resulting from the breaking of an egg.) He also tells how a certain woman, going to buy rice, was offered an article, which, on examining, she discovered to be

saw the vendor. While she is within the house, the shop-boy empties the sugar from the bag and fills it with dust. When this is discovered by her husband, she pretends that she has spilled the sugar, to get at the dust, hoping to discover in it what she had lost. The husband helps to sift the dust, and, so says the malicious narrator, 'defiled his own beard.' The queen hereupon relates how a prince on his way to his bride was decoyed by his father's vizier (the king of a feudal state) into marrying a woman. A traveller whom he meets, hearing his miserable story, consents to exchange sexes with him, on condition of a restoration within a certain time. At the time fixed however, the transformed woman informs the prince of the injustice of taking upon himself this additional burden, refuses to complete his agreement.* The fourth philosopher then tells a story of a bath-keeper giving up his wife to a young prince, in the false hope of obtaining profit without dishonour. The same sago tells another story of a man leaving his wife, each taking to the other an oath of perfect fidelity during their separation. Towards the end of this term, a young man seeing the wife becomes enamoured of her, and seeks to rescue her from the clutches of the prince, and to marry her to a man in his neighbourhood. This latter persuades the wife to grant her employer a meeting, by a story of her daughter having been turned into a black bitch for her crimes, and that he could not save her, but to soon go and see her. The employer is unable to find him, but brings with her the first man she meets, who proves to be the absent husband. The point of the story is in the readiness with which the wife vindicates herself, and puts her husband in the position of the interfering party, by representing the whole occurrence as a trap laid to try his fidelity. The queen tells a foolish story of a wild boar, who, looking up in vain for the figs which he expected an ape to throw down to him, burst the arteries of his neck and was killed. The story of the fifth sago gives a moral to a father's giving his son to the master of his child, of which we have a current European version in the legend of 'Beth Gellar.' He tells also another story of an old woman who procures the expulsion of a thief from her husband's house by laying a man's cloak, known to the husband, under his couch; and afterwards contrives to restore the wife by professing to have left the cloak there by forgetfulness. The queen then tells a story of a thief coming into an inn by night to steal the treasure, and finding them locked for the same purpose, and which he mistook for a mule and mounted. The lion, taking this man for the 'guard-demon of the night' (ο θεός τῆς νύκτος εύτυχος), is terrified, and suffers him to keep his place quietly till morning. 'The manner of a monkey, meeting the lion, asks the cause of his terror, and assuring him that the supposed demon is a man, persuades him to return to the tree to kill him. The lion consents: but the thief contriving to kill the monkey in the tree, the lion, still more terrified than before, takes a precipitate flight.*

The two doves is a story told by the same sage, as a warning against hasty judgments. They had gathered a provision for the winter, which being wet and shrank, brought to the king by a huntsman, and a drop falling on the ground, a fly settles on it; a lizard seizes the fly; the king's favourite ichneumon attacks the fly, having been taught that the king kept a great dog; the huntsman, grumbling at the animal's punishment, is beaten by the king's valet, and all the rest of the company for the same cause. We have many chain-stories of this kind in our own language, and it is scarcely perhaps grave enough for type, but which any one, whose memory only is his punishment, will readily

* A story of the same kind, but with greater marks of originality, is found in Thacker's translation of the Pancha Tantra.

** This is but an indifferent story in the hands of the Greek author, but 'is very entertaining in Tychaeus, who, from the following circumstances, which occurs in Tychaeus' version of the 'Pancha Tantra.' An old goat by misadventure comes to the house of a man, and sitting down to be census, wails loudly up to him. The lion, hearing the sound of a large animal, comes to see the figure, requires the meaning of his visit, and is told that the boar-hound must have something to tell him. 'Then,' says the lion, 'I have the first part of my task, he is ready to begin the second. The lion makes the thing known to the king. The king, as if he knew all by himself, laughs, and makes a great deal of the matter and expatiates, explains the real nature of the supposed monster, and persuades him to go with him to the spot. The old man says he wants to have the two threes of me four twenty, why has thus brought the king? and the lie naturally considering that the fox has betrayed him, makes greater terror than before. In the 'Tychaeus's' version, the story is told by a man, or Soyol Greek, and a Lion and Knightly, in his 'History of Fiction,' tells the tale in another form. A man who, by a similar adventure, was delivered from a dragon,

drying. The male dove, seeing this, accused his mate of having clandestinely robbed the store, and on her denial of this charge killed her. When the magistrates accused him of discovering his error, and too late repented of it. This is one of the fables of the Khaliath wa Dinna, or Arabic version of the Pancha Tantra, but is not found in the Hitopadesa, the later Indian version. The moral of the story is, that only a woman, by the introduction of a honey-cake elephant is much of the same stamp as that of the woman buying rice (already quoted), but is hardly decent enough for quotation. The same judgment may be passed on the man with three wishes,—a satire on the vanity of the world. The wife of Bas had been induced to marry a man of different forms. The next story is also one of those malicious yet favourite jests of which every nation has a copy. A certain scholar has occupied himself, like the lovers of the Wife of Bath, with the fables of women; of the folly of which attempt the wife of his host convinces him by a story and a practical exemplification.

At this point the prince, whose days of trial are accomplished, breaks silence, and explains the perjury of his stepmother. This, though the prince's danger, is not the end of the story. A question arises, who of all the parties concerned would have been in fault if the prince had been put to death. The blame is successively cast upon every one of the actors in the story, when the prince, pretending that he knew nothing of the people of the house, begged permission to relate an apologue. A certain man made a feast, where amongst other viands there was milk for the guests' drinking. Now as the milkman was away from home, the wife took a glass of milk and put it into the hands of a woman, charging her to return it to the three only. One of these women obtain possession of the money by fraud, and when the other two claim from her their deposit, by the advice of a child she holds them to the words of their bargain, that she was not to deliver up the money except to thee: the cause was so strong that although she had used for fuel, and induces him to part with his whole stock at a low rate, for a small coffee full—he does not say of what. A little after this notable bargain, our merchant chances upon a company of these knaves (μαστοί, the Greek author calls them), and is challenged by one of them to a trial of wit, the loser to be subject to the command of the elder. The merchant is beaten, as may be supposed, and is enjoined by the victor to drink up the waters of the sea—an old quibble. Putting off the execution of this audacious duty till the morrow, he is assailed by another 'masted-eyed' worthy, who insists that the merchant, grey-eyed like himself, has stolen his missing optics, and drags him before the judge. On his way he is not by his hostess, who entangles for him the appearance of a more imposing figure, and induces her to attend the merchant to a public lecture to him about his adventure, for she had warned him of the character of her fellow-townswmen, informs him that an old man holds a sort of school of the whole of the people from the whole resort to receive his judgment upon their day's proceedings, and that he must be present there in disguise. Acting upon this suggestion, he hears his three friends severally recount their adventures, and the archimandrite blames each of them in turn: the first of them was not his father's stepson, but the second that in the first he did not write his father's name, the third that he had taken no care of the three who were coming for two, why has thus brought the one and the lie naturally considering that the fox has betrayed him, makes greater terror than before. In the 'Tychaeus's' version, the story is told by a man, or Soyol Greek, and a Lion and Knightly, in his 'History of Fiction,' tells the tale in another form. A man who, by a similar adventure, was delivered from a dragon,
demand from the merchant, in case the latter should think of requiring that the eyes of each party should be taken out and weighed, to determine the ownership of the disputed one. Acting upon these hints, the merchant obtains the full value for his merchandise, and makes besides his own terms with his customer.

The punishment of the queen is then debated on, one proposing that her haunds and feet should be cut off, another that her tongue be cut out, another that her heart be torn from her body. But the unhappy queen not only decreases the number of deaths by shutting up by accident in a walled city, and, finding no egress, lay counterfeiting death at the closed gate of the city. One passer by dilates on the great virtues of a fox's tail for 4 pingon miles; another lauds the virtue of the same tail to a fox child; a third declares that the teeth of a fox are the sor-

vant's thing on earth for a fit of the tooth-ache; and each appropriate to himself the particular part he has eulogised. All this, says our heroine, the fox bore manfully; but when a fourth sage declared that a fox's heart was a remedy for all evils, and took out his knife to possess himself of this panacea, the patient took heart of grace; and leaping up, escaped safely by the gate, which bad by this time unclosed itself. She, according to J. H. Grunze (Vol. iv. p. 22.) Homer and other Greek poets describe the island as rich in pastures, wine, and corn. (Compare Strabo, x. p. 485; Pomp. Mela, ii. 7.) There are still ruins of one of the ancient towns, and many valuable relics of antiquity have been found in the island.

Syra is intersected by hills and narrow valleys. The inhabitants, who previous to the year 1821 amounted to 1000, are of the Roman Catholic religion. In the war with the Turks, Syra remained neutral, for which reason many persons took refuge there, for the purpose of carrying on their mercantile business. The population thus soon rose to 5000; and, after 1828, it amounted to 10,000. During the Greek war, Syra was the central point of operations, and after the conclusion of the peace, commerce was restored in the other parts of Greece, and, in consequence, decreased in Syra; but the chief place of the island, Asprana, is still an important position, on account of the port of Forini. Syra is one of the principal stations for the French steam-boats which sail from Marseille to Constantinople.

(PROKOSCH von Osten, Erinnerungen, vol. i. p. 57. &c.)

SYRACUSE (Σώρος, in Greek; Syracusae, in Latin; Syracuse, in Italian), a town on the east coast of Sicily, 30 miles south-east of Catania. It is situated on the coast of the Ionian Sea, 11 miles by east of Cape Passaro, the southern extremity of Sicily. Antient Syracuse, in the time of its splendour, was the largest city in Sicily, and one of the largest in the antient world: it was 3 miles in length, but 1 mile and a half in breadth, which has been filled up by the masculine imagina-

tion of the North with details which are read with trembling. Those who are desirous of pursuing this subject farther, and of examining more minutely the connection between the fictions of Oriental and Western nations, will find it worth while to refer to some or all of the works mentioned below.Independent of the interest which these collections possess as illustrating the connection of the two most civilised quarters of the globe, they have in themselves a high value, as illustrations of the moral features of Eastern character, of which they contain a very faithful picture. The strong bent towards a bitter humour; the preference, in all maxims of state and policy, of a shrewd and crafty to a blunt and simple honesty; the proceeding of the Greeks to authority in matters of opinion, a disposition common enough perhaps over all the world, but preternaturally deve-lop'd in Asia; and the low estimation in which the female character is held, all these points stand out so plainly in every Eastern collection of tales as to show that he who runs may read. The last peculiarity especially is so exaggerated a trait of Asiatic character, that the object of many entire collec-
tions of tales is to illustrate the supposed worthlessness of the female by way of contrast with the supposed excellence of the male; that the estimation in which the women are held is an index of the degree of civilization of a nation; yet we find 457

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population still continuing to flow, the heights were occupied, and following without interruption the sinuosities of the hill. Not far from Reale Grecia, at a place called Varroville, are the

Not far from the theatre are the remains of an amphitheatre of the Roman period; and nearer to Ortygia are the remains of the palace of the sixty beds, said to have been built by Agathocles, the arches of which are constructed of a kind of hollow tubes of baked clay, and shaped like a long-necked bottle without a bottom. They are filled with mortar; and by inserting the neck of one into the wide end of the other a curved row is formed, and the whole covered with cement, on which flat bricks are laid. Near it are vestiges of the wide street mentioned by Cicero, which may be traced from the isthmus of Ortygia, and across the site of the upper town, to a spot called Santa Bonaccia, on the point of the Portus Trigilias.

The Latomiae were originally quarries excavated in the rocks that divide the upper from the lower town, from whence the stone for the construction of the city was drawn. They are from 60 to 80 feet deep. Some of them afterwards served as prisons; and on the surrender of Nicias the whole of the Athenian prisoners were confined in them and mostly died. The largest of these Latomiae is annexed to the Capuchin convent of Palombino. A romantic garden and grove of fruit-trees called La Belva is formed at the bottom of it, and is secured from every wind by the surrounding cliffs. Another Latomia, which is near the antient theatre, is planted with olives, oranges, lemons, pomegranates, almonds, and figs. On one side of it, cut in
the rock, is the remarkable excavation called the Bar of Dionysius. It is in the shape of a parabolic curve, ending in an elliptical arch, with sides parallel to its axis, perfectly smooth, and covered with a slight stuccoic incrustation that renders its repercussions amazingly sonorous. Although a new foundation was laid on the site, which I ascertained by excavation, it is still 64 feet high, from 17 to 35 in breadth, and 187 deep. It has an awful and gloomy appearance, which, with its singular shape, perhaps gave rise to the popular and amusing paradox that Dionysius himself conversed with the Great Sphinx, which he deemed imitable to his authority, and that from the little apartment above he could overhear all the conversation among the captives. He could not however have listened with satisfaction, for if two or more people were speaking together it occasions only a confused clamour. (Captain Smyth's Memoir descriptive of Sicily.)

The catacombs are vast excavations, of very remote antiquity, for the purpose of burying the dead: they form subterranean streets of tombs cut out of the solid rock. They were converted by the early Christians into places of refuge from persecution. The entrance to them is under the small church of San Giovanni, in the lower part of Acita. This church is one of the oldest Christian churches in the state; it occupies the tomb of the dead of all ages and faiths—Greek, Roman, Christian, and Saracen.

The aqueduct was begun by Geron and enlarged by Hieron. The stream is brought in subterranean channels from the springs, and the Epipome, until it enters the walls at the place where the fort of Labudal stood. It then appears above ground, being received into an aqueduct upon arches and conveyed to some mills, after which the water falls down the steps of the great theatre at Napolis. Outside of the walls, and on the left bank of the Anapus, near the Great Harbour, are parts of the shafts of two fluted columns of the temple of Jupiter Olympicos, which was erected by Hieron, and of two columns of the Temple of Mars, which also bears a square base and fluted shafts. These are six feet and a half in diameter, and rest upon a plinth of two steps. There are other antient remains scattered here and there, but of no ascertained character.

The modern town of Siracusa, which, since the devastation of Siracusa by the Saracens in the fourteenth century, has been extended to the peninsula of Ortygia, is fortified, and has a regular garrison, but is commanded by the height of Acradina. It is a bishop's see; has 13,000 inhabitants, narrow streets, numerous churches, monasteries, and convents, and many remarkable buildings, the most remarkable of which is the cathedral, once the identical temple of Minerva, which was plundered of its ornaments by Verres. Its exterior dimensions are 185 feet in length and 75 in width. It has been repeatedly repaired. The present foundation is in the angles, and also some remains of Diana's temple near St. Paul's church.

A bath, with a spiral staircase about 40 feet deep, is seen in the church of St. Philip; and there are also vestiges of the baths of Daphne, in which the emperor Constant was assassinated in 324.

The celebrated fountain of Arethusa is a large pool of water, supplied by a spring, and separated from the sea by a wall, in the Ortygia, near the Great Harbour; and about 50 yards from it rises from the bottom of the harbour a copious spring, called 'Ondina della Zelica, which, according to the ancient poets, was the Alpheus of Eu.

There is a museum at Siracusa containing the statues of the Landolina Venus and Boscapulius, some sarcophagi, a hand of man from the body of a sycomore which was cut off in a winter storm, and the great public library. The principal private cabinets are those of Landolina and Capodicia.

Siracusa enjoys a delightful climate in winter, but the prevalent wind on the west side of the harbour, through which ships sail, is unhealthy and destructive, and the winter months. The country around is very fertile. On the left bank of the Anapus is the fountain of Cyane, now called the Puma: It is a circular basin of the purit water, about 60 or 70 feet in diameter, and 50 feet deep, stocked with fine fish. From it the water flows in a quiet deep stream, the river Anapus; on the sides of the stream is found the Cyprurus Papyrus floating in abundance.

Many of the women of Syracuse, especially of the lower orders, are remarkable for the Grecian contour of their features. The people carry on some little trade by sea, but the place is by no means thriving.
Eurymedon
His
Here
Syracuse
and
the
government
Nicias,
their
answer
the
formidable
Sicilian
soldiers.

Great
Athenian
commanders.
An
expedition
withdrew.

Athenian
forces
remained
in
Sicily,
Nicias.

Egesta,
agreements;
that
the
Gela,
Plemmyrium.

Syracuse,
the
Athenians,
Syracusans.

the
heights
of
Plemmyrium.

Another
sea-fight
took
the
Athenian
galleys
were
wounded.

sent
to
Corinth
and
Sparta,
the
Athenians
in
encampment.
The
Syracusans
attacked
the
Athenian
battle
in
the
Great
Harbour;
the
fight
was
not
decisive;
but
Gyippus
with
his
land
forces
swept
the
forts
where
the
Athenians
remained
in
Sicily.

The
Syracusans
sent
to
Corinth
to
demand
assistance.

Athenian
for
the
Sicilian
attack
their
forts;
the
soldiers
were
embarked
on
the
land
by
night;
the
Athenians
were
repulsed.

The
Athenians
withdrew.

Syracusans,
the
Syracuse,
and
the
Athenians
in
Sicily.

the
Athenians
in
Sicily,
Nicias.

The
Athenian
expedition
of
three
times,
with
a
considerable
land
force,
including
Nicias,
Alcibiades,
and
Lamachus,
after
the
Sicilian
expedition,
Magenta,
Camari
cusa,
Egesta,
and
other
towns
in
Sicily,
in
quest
of
alliances
against
Syracuse,
but
almost
all
the
towns
in
Sicily,
did
not
openly
join
the
Athenians.

The
Athenians
however
occupied
the
island
of
Catana,
the
Athenians
in
Sicily,
Nicias.

Syracusans
were
sent
to
Corinth
and
Sparta,
the
latter
chiefly
at
the
suggestion
of
Alcibiades,
who
had
taken
resignation,
resolved
to
send
Syracuse
under
Gyippus,
a
commander
of
the
Athenian
force.

In
the
spring
of
416
B.C.
Nicias,
the
commander
in
Syracuse,
put
his
forces
in
the
bay
of
Thapsus,
with
the
Athenians,
the
Syracusans,
and
the
Sicilians.

Nicias
and
his
men
were
attacked
by
Gyippus
and
a
Syracusan
army
in
the
night;
the
Athenian
forces
were
repulsed;
the
Athenians
were
repulsed.

the
Athenian
expedition
withdrew.

The
Athenians
in
Sicily,
Nicias,
the
Syracusans
were
sent
to
Corinth
and
Sparta,
the
latter
chiefly
at
the
suggestion
of
Alcibiades,
who
had
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Syracusans,
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Nicias
and
his
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by
Gyippus
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army
in
the
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the
Athenian
forces
were
repulsed;
the
Athenians
were
repulsed.
Syria extends from 25° 45' to 37° 25' N. lat., and between 34° 10' and 38° 45' E. long. The boundaries are well marked one the north by the range of Mount Taurus which at present goes by the name of Alma Dagh (the antient Amanus), and towards the west, where it is washed by the Mediterranean Sea; the boundaries are ill defined towards the south, for the desert which surrounds it is separated by deserts inhabited by nomadic tribes, which sometimes acknowledge the authority of the Turkish sultan, but more frequently disregard his orders and those of his governors. The boundary between Syria and Egypt begins on the east of the Nile, and follows the right bank of the river northward to Gebel Arab; and thence runs south-south-west to a small fortress, called Nakhal, situated in the stydy desert, which bears the name of El Tyh Beni Israel. From this place it extends nearly due east across the desert, until it meets the Wady Arabah, which it crosses at the base of a high mountain, called Hor Teros, which, according to Bueckhardt, constitutes the most southern point of the Buelet of Damascus, or El Sham, and of all Syria. This summit is near 29° 45' N. lat., or 17° 30' E. long. About 10 miles southward of the summit of the Gulf of Akabah, which is the eastern branch of the northern part of the Red Sea. [Red Sea, vol. xix, 344.] From this summit eastward Syria borders on the desert of Arabia, and in these parts the border is laid down by the Wady of the same name, which is a stream of considerable extent and breadth, and which consists on each side of these valleys, and the countries contiguous to it on the west and east.

1. The Southern Longitudinal Valley extends from the most northern point of the gulf called Bahr Akabah to the Bahr el Houle more than 250 miles in a straight line, and is naturally divided into three sections by two deep depressions, which are occupied by two large lakes. In the southern depression is the Dead Sea, called by the natives Yamen; but in the north, which lake of Great Sear, now called Bahr el Tabariel, the southern return to the Dead Sea, by which that lies between the Bahr el Akabah and the Dead Sea, is called Wady el Arabah; the central portion, between the Dead Sea and the Bahr el Tabariel, Wady el Ghour, or the Wady of the Ghour stream, which extends from the Bahr el Tabariel to the Bahr el Houle, is called We'day el Seizanis.

The Wady Arabah extends from south to north in a straight line for about 110 miles. The existence of this long and extraordinary unknown valley isChronicles of the great publication of Burekhardt's travels (1822), and since that time it has attracted the attention of geographers. Many were inclined to think that, at some remote period, it had served as the channel by which the Dead Sea had discharged its waters into the Gulf of Akabah; and perhaps the descent which extends thence into this body of water, and that this can never have been the case, as the level of the Dead Sea is considerably lower than that of the Red Sea. Several barometrical observations had established the fact that the difference in level of the two seas considerably exceeds 600 feet; but a late traveller, Russeguier, who has taken great pains to ascertain the exact amount, has found that the Dead Sea is 1341 French (or 1431 English) feet below the level of the Mediterranean. The watershed between the two is about 11 miles, about 40 miles from the Bahr Akabah. It does not however seem to traverse the valley in a straight line from east to west, but obliquely from south-east to north-west, and thus to occupy several miles from south to north. On each side of the water, the Dead Sea is about 10 miles wide, forming a great elevation. Near the watershed those on the west attain, according to Burekhardt's estimate, 2000 feet; and those on the east rise to 3000 feet. In approaching the height, we are struck by the contrast between the barren and sandy regions, and the luxuriant and fertile plain on the west, which is the bed of the sea. The latter is low, unlevelled, and much diversified with little hillocks and marshes, where the soil is strong and impregnated with salt, but farther north sand prevails, and is intermixed with pieces of granite, porphyry, and greenstone. After the rains the country produces small lakes and springs, and sometimes a stream, such as the Wady Jib, which at that season collects all the waters that descend from the eastern and western mountains, and conduces them to the Dead Sea, which is on the north-west side.

The form of the surface is no less peculiar. The central part is furrowed by a longitudinal depression, or wide valley, which extends from its most southerne point, the Bahr Akabah, to the base of the Alma Dagh, where it terminates with the sheet of water called the Gulf of Persia. This depressed valley, which extends over more than seven degrees of latitude, is divided in the middle (between 33° 15' and 33° 25') into two valleys by a high narrow ridge of mountains, the Jebel Arab; and this ridge also divides the waters which flow into the Bahr Akabah from the west, and directs them northward. Thus the great valley is divided into two valleys, of which the southern is traversed by the river Jordan on the greater part of its extent, and is considerably below the surface of the sea. The northern valley is drained by the rivers Liettani and Onoetos (Orontes). In its most elevated part, near the town of Baslub, it attains an elevation at which in Europe corn can seldom be grown. The central portion extends in some parts in elevated table-lands, in other places sunk down into large plains, and again rise into mountains, the summits of some of which are always covered with snow. The only indications of the mountain remain to be found in the steep and precipitous Powers. We limit our description to the great features. Southern Syria extends from the southern boundary of the country to 32° N. lat., or, more precisely, to the Bahr el Houle, which is 29° 45' N. lat., and comprises the southern valley, and the countries contiguous to it on the west and east. 

2. The Semitic Lowland is the most southerly, and the most elevated, of all the natural divisions of the country, and is divided into two valleys, the eastern, called the Dead Sea, and the western, the Bahr el Houle, or the Gulf of Akabah.
Blau, when it turns to the eastern mountains, the base of which it flows for more than ten miles, and then returns to the western side, but afterwards continues rather in the middle of the valley. The mountains that enclose the valley on the east are steep and high; they are also high and steep on the western side for nearly half a length of the valley, beginning from the south; but the north they sometimes sink down to low hills, and even to a mile wide, and at least forty feet below the general level of the Ghaur. This bottom is overgrown with high grass and exhibits a luxuriant vegetation of plants and grass which present a striking contrast with the sandy and bare slopes which border it on both sides. In winter, the river inundates the bottom, but never rises to the upper bed. This upper plain is furrowed by numerous rivulets which descend from the mountains and form numerous stagnant water after the rains have ceased. In summer and near them, there is a luxuriant growth of herbage and wild grass, but the greater part of the ground is a desert, of which only a few spots are cultivated by the Beduins, who however keep large herds of camels and goats. The most important articles of cultivation are wheat and dhurra, but especially barley, which is grown.

Towards the Dead Sea, the bottom of the river is marked by a series of terraces, the slope of the ground from the base of the mountains to its banks being very gradual, but the undulating. In these parts the Ghaur has a greater degree of fertility, and produces good crops of grain; but the small portion is under cultivation. On the banks of the river there are willows, poplars, and tamarisks, and higher ground plantations of vines, pomegranates, nehek-trees and zakkum-trees (Elagnus angustifolia). South of the ruined village of Richa (Jericho), and as the Dead Sea, the valley is nearly level, and the bed consists of clay impregnated with salt, and produces salticornia, which is collected by the Beduins, as it is obtained from it constitute an important article of trade for commerce, as many places have soap manufacturers. (See account.) The climate of the Ghaur is exceedingly hot. It is stated that the crops in the valley are four weeks later than at Jerusalem, which is easily accounted for, the deep depression of the valley is considered, and the extent of Jerusalem, which is nearly 2500 feet above the sea.

The Bahar el Tabarieh, formerly called the Lake of Tari and of Gennesaret, occupies about 12 miles of extent of the valley in length, and about half as wide. It is surrounded with steep and lofty mountains except on the south, on both sides of the outlet of the Jordan, where there is a sandy plain, and except along the western shore, from the town of Tabarieh northward, it is an undulating plain, with an average width of a mile or little more, intervenes between the mountains and the lake. A considerable portion of this plain is cultivated by means of irrigation, and produces wheat, barley, dhurra, lentil, grapes, melon, and several kinds of vegetables. Bernardi is of opinion that all kinds of tropical fruits raised here, the heat in summer being excessive; and he observes that the melons ripen four weeks sooner than at Damascus, to which town great numbers of them are sent. Some dates are also grown here, but there are no regular plantations. In the winter some cold surprises, but in the spring is rare; snow also is rare. The water of the lake is slightly brackish, and some of the rivulets which descend from the western mountains are salt. There are also springs.

The Wady Seissaban, or northern portion of the southern valley, extends from the northern extremity of the Bahar el Tabarieh to the southern banks of the Bahar el Huleh, for 15 miles in a straight line. Perhaps one-half of this extent is below the sea-level, as the bridge called Bent Yash, 350 feet above the sea, whilst the lake of Tabarieh is 17 feet below it, as already noticed. The river flows in a narrow bed with an extremely rapid current. The higher grounds of the valley, which is here about two miles wide, are partly cultivated; and on the greater part of the cultivated tract different kinds of vegetables are grown, especially cucumbers and gourds, which ripen three weeks sooner than at Damascus, where the produce finds a market. There are many sakkum-bushes (Elagnus angustifolia) and the thorny rhamnus (Rhamnus spinosus) in the lower part of the valley. The Bahar el Huleh, which is at the northern extremity of the valley, and which is the
The area is known for its verdant plains and summer weather. The verdure of the Nahr el Hasbeya is particularly notable, providing a stark contrast to the barren hills that surround it. The hills are characterized by their rocky and barren nature, with only a few areas of vegetation able to thrive in the harsh conditions. The area is also known for its watercourses, particularly the Wady Seissan, which flows through a narrow valley between the hills. The watercourses are barely visible, with only a few areas of vegetation able to thrive in the harsh conditions.

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The southern portion of the plain is a desert, whose surface is composed of sand, diversified by small hills which are produced by the strong winds, and a few wide depressions in the form of valleys, through which in winter-time the numerous watercourses of the Tyh find their way to the Mediterranean. It is certainly worse than the Tyh itself, as it is not visited even in winter-time, and there are no trees and verdure in the valleys. In this desolate region the samit originating, with few exceptions, upon the southern part of this plain, to which it brings clouds of burning sand. The desert occupies the sea-shore between the delta of the Nile and the town of Gaza, and the sand blown from it into the sea is the principal reason why the shores of the Mediterranean, especially north as Cape Carmel are chocked up, and admit only small vessels. On the sea-coast the desert terminates near Gaza; but at the foot of the table-land of Judaea it extends about 10 miles farther north. The fertile portion of the plain of Palastin consists of a tract extending along the sea, with an average width of 5 or 6 miles, as far north as 31° 40' N. lat., where it widens so as to reach the table-land of Judaea. A tract with a sandy barren soil, and an entirely level surface, extends along the sea; but farther inland the country is undulating, or interspersed with low hills, between which there often occur cultivable spots which contain plantations of fruit-trees. The most fertile part of the plain extends on both sides of 32° N. lat., and is known by the name of the Plain of Carmel, or Carmel. This table-land is a series of a rounded and intermixed with some gravel, it has a considerable degree of fertility where it is irrigated, and produces good crops of grain, and several kinds of fruit, as figs, olives, pomegranates, oranges, and the tender-melons, all of which are of sufficient quality. There are many date-trees, sycomores, prickly pears, and aloe. The surface of this tract is interspersed with numerous small isolated hills: only a comparatively small portion is under cultivation, for want of water. The most northerly part of the plain, or the narrow tract between the base of Mount Carmel and the Mediterranean, has a still better soil, and, where cultivated, produces wheat, barley, and cotton; but a great part of it has been converted into pasture for the flocks driven from Mount Carmel, and not finding their way into the sea owing to a series of sand-hills which have been thrown up along the shore by the south-west winds, which prevent their discharge. These swamps make rich pasture for cattle.

5. Jebel Carmel, or Mount Carmel, constitutes a remarkable feature in this part of Syria. [Carmel]

6. Between Jebel Carmel and the north-east corner of the table land of Judaea, which comes close up to the lake of Tabariyah, extends the plain of Merj Elon or Mer, the ancient Philistia. [Tyre]. At this extremity of Syria the mountains on the banks of the lake of Tabariyah, is only from 5 to 6 miles wide; and in the middle of it rises a round isolated summit, Jebel Tor, or Talor. [Tabor]. From this summit there is a fine prospect; and between Nazareth and Jenin it is nearly 15 miles wide. Its extent from east to west probably does not exceed 15 miles. At the foot of Jebel Tor the surface is 466 feet above the sea; but it lowers quickly as we proceed westward, so that the greater part of it has a very moderate elevation above the sea-level, as is evident from the slow current of the river Naher el Mekans (the ancient Kishon), which, after a heavy fall of rain, inundates the adjacent country, and converts it into a swamp; but the swamp supplies good pasture for cattle. The principal plain is the southern part of this tract. Though the soil is of considerable fertility, only a small portion of this tract is inhabited. Corn and cotton are grown. Near the base of the hills and mountains surrounding the plain there are forests of evergreen oak, and in these parts there are also plantations of fruit-trees.

7. To the north of the Plain of Ebun Omer extends the Hilly Region of Galilee, which is the most fertile part of Syria. This level surface presents hills rise with gentle acclivities, and subside into plains several miles in extent, or are separated by wide valleys. The highest hills lie west and north-west of Nazara, which attain an altitude of 3000 feet above the sea; and the base of the mountains of Nazara is in a flat valley on the declivity of a hill, 876 feet above the sea-level. The whole region seems to be fit for cultivation, and a considerable portion of it is cultivated, though there are extensive tracts, especially in the smaller valleys, which are covered with forest-trees. Corn and cotton are extensively grown, and form considerable articles of internal commerce. The olive and fig trees cover considerable tracts. Date-trees do not succeed.

This description applies only to the country south of 35° N. lat. The country north of it, and extending as far as 33° 30', is entirely unknown, with the exception of the immediate vicinity of the Mediterranean.

6. Along the Mediterranean extends the Plain of Akka, and also the district of Jebel Carmel, and extends northward to Ras El Abiad, or the White Cape, a distance of more than 20 miles. Between Jebel Carmel and the town of Akka (Acre) it may be four or five miles wide. The southern and wider portion has a sandy soil in the vicinity of the sea, but farther east it is tolerably fertile and moderately cultivated. In the northern district there are some stony tracts, though in general it is stated that the country possesses a considerable degree of fertility, but nearly the whole is uncultivated.

9. We pass to the east of the Southern valley. The most southern part of Syria is occupied by the extensive table-land of Petraea, which contains the mountain-regions of Shera and Belka, which enclose the Wady Arabah, the Dead Sea, and the Ghaur on the east, and also an extensive plain lying east of these regions, and continuing in that direction to the Desert of Arabia. The southern boundary of the Petraea district consists of a range of hilly ground, the southern point of Syria, and thence runs to the north of east to Akabah, or Shamie, on the Hadji road of the Syrian caravan. In these parts it is marked by a steep descant, which leads from the table-land of Petraea to the plain of Moab, in which the Wady Arabah is the chief valley, in which several places occur where wheat and barley are cultivated, and extensive plantations of vines are found. These articles are easily disposed of by the Arabs to the pilgrims, as the greater part of the valley is not cultivated, owing to the great current of water, which not only is not grown in these parts of Syria. The El Zobie range terminates on the south at the source of the river Modjeb, and farther south the Hadji road lies within the plain; but dhurra and barley are grown only a few places, a long valley, in which several other places, especially at Maa, there are large plantations of pomegranates, apricots, and peaches; with the exception of these isolated spots along the road, the plain is only used as pasture-ground by the Beduins.

The Extremity of Syria. The most northerly part of Jebel Hesna extends to the river Modjeb, from 29° 40' to 31° 30' N. lat., between the Hadji road on the east and the Wady el Arabah on the west, and occupies about 20 miles in width. When seen from the peaks of Mount El Naser, the Wady el Arabah, with its appearance, extends at a great range, at least 1000 feet higher than the mountains which enclose the Wady on the west, or about 3000 feet above the level of the valley; but when seen from the east, or the great plain, the mountains appear only as hills a few hundred feet elevated above the level of the plain, which shows that the great plain of Petraea is also at a considerable height above the sea. The mountain-region of Shera comprehends three districts, of which the southern properly is called Shera, that in the centre Jebel, and the northern Kerek. The whole runs along, running generally from south-east, north-west, and separating deep depressions from one another. The ridges are generally flat on the top, but sometimes covered with low hills, which advance eastward into the plain. On the edge of the plain the depressions begin, presenting themselves sometimes as narrow valleys, and sometimes as basins. The largest of these basins is that called El Obuey, which is much lower than the eastern plain, up to the level above the sea, but it is narrower towards the west. The surface is rocky and uneven, and it is intersected by numerous gorges and by three or four valleys, watered by rivulets, which unite to form the flat into the Arabah. This basin is noted for its excellent pasture, which has rich springs, and is wooded along the rivulets; but there are no woods in the other depressions of this region, nor on the ridges. Villages are rather numerous in these depressions, and are mostly inhabited by Beduin tribes, who have applied
to agriculture, and are industrious. In many parts not only the level grounds are cultivated, but the slopes of the mountains are formed into terraces, which are covered with corn-fields and plantations of fruit-trees. They cultivate wheat, barley, and dhura, and their orchards contain pomegranates, olives, apples, oranges, lemons, and peach trees, and numerous vines. Dried figs and grapes constitute the principal articles of export, together with soda. The rivers which traverse this region generally contain water everywhere but in the summer, when, where it is a plain, the river water reaches the valley of the Arabah. The northern part of the mountain-region of Sbera appears more in the shape of a table-land: for though it is likewise broken by wadies or gulls, they are very narrow, and the country generally extends above the height of a man. It contains a much smaller portion of cultivated land than the southern districts, and is equally destitute of trees, with the exception of fruit-trees, which are planted in a few places. The cultivated tracts are chiefly limited to the neighbourhood of the towns of Tafylle and Kerek, and a few villages; but even the nomadic Beduins cultivate some spots which are favoured by a good soil and springs of water. The climate of this region is extremely agreeable. The air is pure; and though the heat is very great in summer, and increased by the reflection of the sun's rays from the rocky sides of the mountains, yet the temperature never becomes suffocating, owing to the refreshing breeze which generally prevails. The winter is very cold, deep snow often lying on the lower part of the hills. This region would be much better cultivated and more populous if the inhabitants were not exposed to frequent incursions of the Beduins, who live in the eastern plain, and who are skilful and hardy horsemen, in which the Beduins of the Syrian desert excel. The Mountain-regions of the Belka extends from the river Modjeb on the south to that of Zerka on the north, or from 31° 30' to 32° 20' N. lat. Its width between the Dead Sea and the Ghaur on the west, and the Hadji road on the east, never exceeds 15 miles. The eastern districts, or that contiguous to the Hadji road, is little elevated above the road, and consists a plain, most parts of which are interspersed with numerous low and isolated hills. Towards the south this plain is sandy or rocky, and in both cases barren; but towards the north it has a chalky or clayey soil, and is covered with a rich verdure in winter. There are no springs in this upper plain of the Belka, and the Beduins have no water except that which is collected in cisterns during the rains. The whole plain is destitute of trees, and generally even of bushes; but some more hilly tracts are overgrown with thick heath. The western districts consist of a succession of ridges and deep valleys opening into the level ground of the Dead Sea or the valley of the Jordan. There is much space towards the sea, and this is the principal agricultural district of the mountains, and are generally level on the top. In a few places however high hills rise above them. The upper part of the ridges are bars of trees, and generally covered with fints. The narrow valleys between these bars are always wooded at the base, and are called the declivities of the mountains. The northern district, or the country north of 32° N. lat., is an extensive mountain-mass, whose highest part is in the middle of the tract, and is called Jebel Jelaad (Gilead). This higher ridge extends about ten miles from east to west, and near its most elevated summit, Jebel Osha, is what is called the tomb of the prophet Hosea, which is a place of pilgrimage for Turks and Christians. This mountainous country is almost entirely covered with high trees; and its surface is so barren, that it contains very little fertile land. The few valleys, which are under regular cultivation, though some other places are occasionally seen with dhura by the wandering Beduins. The numerous and extensive ruins show that cultivation was formerly carried on in this district, and that it was probably inhabited long before the Christian era. The tombs of the nomadic tribes who live to the east. At present the Belka is considered the best pasture-ground in Southern Syria; and the most powerful tribes of the Beduins are frequently driven by the Beduins of the region. In summer these tribes remain with their herds in the valleys of the western districts, where the grass never dries up; and in winter they either descend into the Ghaur or encamp on the upper plain. They have few camels, but numerous cows, sheep, and goats. Wheat, barley, and dhura are cultivated. The vineyards are extensive near Sibat. Sumach and soda are collected; the first is sent to Jerusalem, and 3000 cases of the latter go to Nabuluss. The climate of the Belka is as pleasant as that of the Shera, and the winters are as cold.

10. The Belad Haouran is to the east of the Ghaur. Along the valley it extends from 32° 21' to 32° 45' N. lat.; and is a district of some importance, though it is separated from the Syrian desert, where it lies between it and the valley of the Euphrates, it advances as far north as 33° N. lat. It consists of two mountain-regions, the Jebel Ajeloun on the west, and the Jebel Haouran on the east, and a plain which lies between the mountain-regions. The Jebel Haouran extends from the sea, to about 33° north, and about as many east and west. It is the most mountainous district of Southern Syria, and the best cultivated to the east of the southern valley. The highest part of the mountains is towards the south, north of the river Zerka (the ancient Jabbock), where the mountains of Moerad and of Jebel Ajeloun rise much above the Jebel Jelaad of the Belka. The whole surface is a succession of mountain masses and valleys, and the valleys are rather large: the region is abundantly watered by streams, which either originate in this region or traverse it in its width, flowing from the plain of Haouran to the Jordan. It has great advantages over all the neighbouring countries as an agricultural district, which is still increased by its greater security against the inroads of the Beduins, being more easy to carry on their depredations in a country which contains so many places that can be defended against cavalry. The numerous caverns also, which occur in the limestone rocks, have been frequently occupied by small, but safe retreats from an invading army. Wheat and barley are extensively cultivated in all the lower grounds, and in some places on terraces made on the declivity of the mountains. There are numerous plantations of olives and vines. The orchards produce pomegranates, almonds, dates, and other fruit-trees. Every kind of vegetable is grown. The climate of the valleys is very hot in summer. Burckhardt observed the thermometer at 106° in the shade. The sides of the mountains are chiefly covered with wood, consisting of oak, pine, pachsia, walnut-tree, and several kinds not found in Europe.

The Plain of Haouran, which extends east of the Jebel Ajeloun, is a level, the northern part of which is frequently interrupted by isolated hills, which are less numerous towards the south, and at last disappear. These southern districts have a very sandy soil, and are almost uninhabited. But the northern districts have a soil consisting of a fine black earth, which possesses a considerable fertility, but is subject to droughts and the cold. A village is built at the foot or on the declivity of almost every hill, but very few of them are inhabited. Most of them however are in such a state that the greater number of the houses can be rendered habitable with very little expense and labour, and it is supposed that they were taken possession of by some wandering peasant for a short time. The Haouran peasants do not fix themselves in one place: they wander from one village to another, and their commodious dwellings in the ancient deserted houses. One camel is generally sufficient to transport their family and baggage; and as they are not attached to any particular spot by the possession of land, they have no repugnance to quitting the place of their birth. They are chiefly induced to change by the great increase of the Beduins, who are considered the true proprietors of the plain. The few cultivated spots of the plain occur only on the banks of the rivers which descend from the Jebel Haouran, and in winter-time bring down a great volume of water, which is skillfully employed in irrigating the fields for crops of wheat, barley, or beans. During the winter the plain produces excellent pasture for the herds of the Beduins. There are no trees. The cold in December and January is severe.

The Jebel Jelaad is about 5 miles from the Jebel Ajeloun. It extends from 32° 25' to 33° N. lat., but no part probably is more than 12 miles across. It is surrounded by plains, which are lower than the base on which the mountains rise; though it is the subject of the proverb that they rise at a constant elevation above the sea. This table-land is covered with some ridges running in different directions. The highest part of the mountain system is near 32° 40' N. lat., where the Kelab Haouran, a summit...

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in the form of a cone, rises considerably above the lower ridge on which it stands. It is wooded on the north and west sides by a temperate forest which extends from the Mediterranean coast and applies to the whole mountain-region. In its present state only the northern and western base of this region are inhabited and cultivated, and cotton and tobacco are extensively grown. Vast crops of cereals, barley, maize, hemp, and beans are cultivated. The soil on which the mountains are clothed is only stunted oak. In the mountains there are extensive pasture-grounds, even where there are no trees, as at the southern declivity of the region, where a great number of unincultivated villages are situated in the benches, are situated in a tolerable state of preservation. In the month of November the Kelab Haoran was not covered with snow, but at its base Burckhardt experienced a hoar-frost.

East of the Jebel Haoran is the Syrian desert, of which Burckhardt gives an account. He describes the area as a great expanse of bare, sandy desert, with the exception of the extensive ravines and wadys, which produce occasional crops of barley, wheat, millet, corn, beans, and lentils. These wadys are usually dry, except during the rainy season, when they are filled with water. The vegetation consists of low scrub and thorny shrubs, such as the tamarisk, the balloon, and the acacia. The summer months are extremely hot, but the night is cool. The winters are cold, and the region experiences heavy snowfalls. The soil is generally sandy and barren, and the land is not suitable for agriculture. However, some areas are used for grazing, and the winter rains are essential for the pasture.
of the valley is called Belad Baalbec. The soil of this tract is not much inferior to that of the Bekaa, but the proportion of cultivated land is less at Baalbec, and cultivated land is not used at all, is still less than in the last-mentioned district. Only a few villages occur in the middle of the valley, which, as well as the Bekaa, is destitute of trees; but the hills which surround the valley are covered with a variegated flora, especially along the Antilibanus, where small rivulets descend from the mountains and supply the means of irrigating the corn-fields and orchards.

3. The Antilibanus, which stands to the east of the valley just opposite to the Bekaa, is less lofty than the south than the Libanus. It is divided into two portions by a long and narrow depression across the mountains, which occurs near 33° 40' N. lat., and is called El Bogaz (the Gorge). The most frequent branches off from the Bekaa at the base of the mountains, especially along the Antilibanus, where small rivulets descend from the mountains and supply the means of irrigating the corn-fields and orchards.

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viable soil, free from stones and sand, though, like all the plains of Damascus, it is destitute of trees and even of shrubs. Villages and cultivated tracts occur only at great distances. The inhabitants of the Syrian desert probably prevent the extension of agriculture.

Northern Syria comprehends that portion of the country which lies north of 34° 40' N. lat. It differs in physical constitution from the more southern parts. A high mountain chain extends along the coast of the Mediterranean in some places close to them. At the back of it is the northern portion of the Northern Valley, which is divided by a hilly tract, extending from south to north, from the Eastern Plains.

The Mountain Region of Northern Syria is divided into two portions by the lower course of the river Aassy. The southern part, which comprehends about two-thirds of the whole, is known by the name of Jebel el Anzery, and the northern by that of Jebel Ahmar.

The Jebel el Anzery is divided from Libanus by a gap or depression, which extends from 34° 40' and 34° 30' N. lat., and is nearly 10 miles across. It is a low plain, called El Junieh, which is nearly a dead level. Numerous torrents descend from the contiguous mountain-ranges, especially the Jebel Sharr, or northern extremity of Mount Libanus, and when copious rains fall in the mountains the plain is converted into a swamp. It is therefore uninhabited, and only used as pasture ground by the Turkmans and Kurds.

The Jebel el Anzery occupies its branches the whole tract between the Mediterranean and the Northern Valley, and is in width about 20 miles or somewhat more, extending north and south; there are one or two offsets branches off eastwards, and terminates on the banks of the river Aassy, near the town of Hamah. It is called Jebel Erbayn. In this part the Jebel el Anzery is about 45 miles wide. The highest part of the range lies in general close to the valley of the Aassy, so that the space between it and the sea is filled up by numerous offsets, which sink down to low hills and enclose valleys of moderate extent. The principal chain terminates east of the town of Antakia, in the mountains of the Azur which is connected with another chain of mountains, which rises a few miles north of the town of Latakia, and runs so close to the shores of the sea, that no road can be made along its western base. The declivities towards the sea are extremely precipitous and barren. It is the Mons Cassius of the ancients, and is now called Jebel Akrah, or Otkrah. It attains an elevation of 3238 feet above the sea. When the Jebel Akrah meets the Jebel el Anzery, it forms a table-land of some extent, which is covered with grass, but without the description of the Jebel Anzery is unknown, but it never much exceeds 6000 feet above the sea-level. Its eastern declivity is generally very steep, and only covered with shrubs and low trees, but the western declivity is less steep, and the valley which lies between its offsets are cultivated with as much care as those of Mount Libanus. Orchards and plantations of mulberry-trees cover a great part of these valleys.

Jebel Ahmar, or the northern portion of the mountain-region, begins on the Mediterranean, occupying the space between Ras-el-Kanzier (36° 20' N. lat.) on the north, and Jebel Mussa, the Mons Pierius of the ancients (36° 8' N. lat.), on the south. Near Ras-el-Kanzier the summit called Jebel Sarr, rises to 5500 feet above the sea-level. From this summit the range runs north-east, but by degrees turns more to the north, so as to enclose the Gulf of Scanderdon on the east with a curved line. It joins the Alma Dagh about 10 miles north of 37° N. lat. Near 36° 30' the road between Scanderdon and Antakia traverses it, and the most elevated pass is 4068 feet above the sea-level. This range never exceeds 5 miles in width. The mountains generally descend towards the Gulf of Scanderdon with a gentle declivity, and approach near its shore except towards the north, where a level tract about two miles wide intervenes in the mountains which gradually increases to the breadth of seven miles. This wider part is fertile and cultivated, and it is diversified with orange and lemon groves. The remainder is almost entirely desert, and only north of 34° 20' N. lat.

2. The northern portion of the Northern Valley begins at the termination of Mount Libanus (34° 40' N. lat.) and Mount Antillibunus (34° 20' N. lat.). North of these places a level country extends across the whole breadth of Syria, from the Mediterranean to the Euphrates, which is only interrupted in the eastern plains by ranges of low hills. The plain contiguous to the river Aassy and to the caravan-road leading from Damascus to Homs presents only a few cultivated tracts, and the old ascents, by which the descent to its bottom appears to be continuous. It is a quite destitute of trees; and though a great part of it is fit for cultivation, the extent of the cultivated tracts is small, and their number not great, which is mainly owing to the want of water.

The Jebel el Anzery begins in 34° 40' N. lat., and on the plain extending east of the river Aassy a ridge of hills called Jebel el Asla rises near 35° N. lat. This last-mentioned ridge descends north-east from the Jebel el Anzery, or eastern offset of the Jebel el Anzery, south of the town of Hamah, near 35° 5' N. lat. From this point the river Aassy runs in a narrow valley, which is enclosed by rugged mountains, and whence Burekhardt compares with that of the Wye in Monmouthshire. The valley however widens in some parts, and in one of these plains the town of Hamah is built. The length of this narrow valley is about 12 miles. At the northern extremity of this valley the eastern ridge sinks down to the level of the plain, but two or three miles further north it rises again under the name of Jebel Sheahsabon, and here begins that fine valley which is called El Ghab, and which is about 35 miles in length: its width is about 5 miles, but it grows narrower towards the north. The river flows in gentle basins, and it forms numerous channels. It here inundates the level ground, through which it flows and leaves many small lakes. The valley is also watered by numerous rivulets which descend from the adjacent mountains, and which flow from these mountains to the Ghab never dry, and scarcely even diminish during the height of the summer. The wider valley of the Ghab terminates at Jebel Shogher, and hence the Aassy runs northward in a narrow valley, which contains very little land fit for agriculture; but the sides of the mountains are covered with plantations of fruit-trees: those of mulberry-trees and olive-trees are very extensive.

Where the Aassy emerges from this valley, and, turning northward and west, flows along the base of the Jebel el Anzery, an extensive plain opens to the north, the ancient plain of Antiochia, now called El Umk, which stretches to the base of the Alma Dagh. It is about 35 miles long, and 40 miles in breadth. Towards the middle of the plain there is a deep depression, which descends from the mountains surrounding it on the east, north, and west, and form an extensive lake, called El Bohair, the ancient Lake of Antiochia. It is about 12 miles long and 6 miles wide, and noted for its fish, etc., as forming an article of commerce. The country surrounding the lake rises in very gentle slopes towards the base of the Alma Dagh. The rivers which descend from them run in that narrow valleys. The northern part of the valley is cultivated, and produces wheat, barley, and several kinds of pulse. The base of the surrounding mountains was formerly covered with trees, but the woods have been destroyed. The Lake of Bohaire discharges its waters into the river Aassy by a navigable channel, called Karna-ia (Black River), which runs south-south-west through the southern and lower part of the plain, which is entirely level, and for the greater part of the year nearly a swamp. No part of it is cultivated, and it is only used as pasture-ground.

The river Aassy, or the river of the Northern Valley, which is connected with the Mediterranean by the valley in which the Aassy reaches the sea by a west-south-west course. This last-mentioned valley is nearly 30 miles in length, and from 4 to 6 miles wide between the Jebel el Anzery and the Jebel el Ahmar. The river terminates at the base of the Jebel el Anzery, and on its northern banks is an undulating country, generally well cultivated. Much tobacco is grown, and the plantations of mulberry-trees are extensive: other fruit-trees also abound
The river Assy, called by the antients Orontes, rises in the Belaid Baalbek, between the Libanus and Antinarius. Its true source is still disputed. Buckingham places it between 34° 20' and 34° 22', in the valley of Mount Libanus; but Barker (London Geogr. Journal, vol. vii. 100) places it at the base of the Antinarius, near 34° 15', where a copious spring rises from a natural basin in the rock. He observes however that the river Labweh unites its waters to that of the Assy drains the northern part of the Belaid Baalbek, where it receives a considerable supply of water by the streams which come down from the eastern declivity of Mount Libanus. After having entered the plain north of the mountain-ranges, it falls into a lake, called the El Suubk, which is about six miles long and two wide, and by some travellers is considered as artificial.

So far the river runs north-east, but it then turns north, and surrounding the base of the Jebel Erbayn by a great bend, enters the valley and runs north-west and then north, until, in approaching El Umm, it gradually declines to the west and west-south-west, in which direction it reaches the sea near the village of Swelidjah. It is not navigated, but it is said that it could be rendered navigable for boats as far as the mouth. There is also a lake called 'tells,' at the base of Antakia, though its current is rapid below Antakia, the fall not exceeding five feet and a half per mile. Its mouth is obstructed by a bar, over which there is from three and a half to nine feet of water in winter. Part of the country through which it runs is a low, undulating, marshy land, and other parts are supplied by it with the means of irrigation. The whole course of the river probably exceeds 200 miles.

2. The Hilly Region, which extends to the east of the valley of the Assy and of the El Umm, from the town of Hamah to the base of the Alma Dagh, may occupy about 10 miles in width, south of 36° 10' N. lat., but where it is contiguous to the El Umm it is more than twice as wide. The western part of this region is the best part of the old limestone rocks rising to a considerable elevation, and enclosing valleys. But many of these hills are only covered with bushes, and the arable grounds are not extensive. Barley and dhuuras are grown. Vines are much cultivated, and grapes and dates are sent to Aleppo. The northern part of the Hilly Region does not present high and steep ridges, but is rather an undulating country on a large scale. The hills indeed rise to a considerable height, their higher parts exceeding 500 feet above the base on which they stand; and their slopes are gentle, and the depressions between the higher ground so wide, that they constitute rather plains than valleys. There are no watercourses, as the limestone rock abounds with lime, and they are not fertile, and yields good crops of wheat and other grain. To the north-west and north of Aleppo the soil is indeed stony, but the earth is deeper, and cultivation is rather extensive. In many parts now lying waste it could be cultivated with advantage, which is proved by the great number of ruined villages which occur in these parts. The Hilly Region appears to be contiguous to the road leading from Aleppo to Antab, especially towards the base of the Alma Dagh, where it is well watered, and yields more than one crop annually, though it is also stony. These plains in general do not sink below 1000 feet above the sea-level, except as we approach the Euphrates. Where they were crossed by the Euphrates expedition, between Aleppo and Antab, the surface of the Kowain was found to be 1263 feet above the Mediterranean, and that of the Euphrates, below Bir, is only 626 feet above that sea.

The climate of the plains, and especially that of the town of Aleppo, may be compared with the climate of Rome, though the difference in latitude amounts to more than five degrees and a half; but they are more exposed to the former in the month of December than in the month of January. There is generally some frost, but it is slight, and the snow seldom rests more than one day on the ground. In February the vegetation is vigorous, and the trees are in blossom; but the spring soon passes, and at the end of May nearly all the smaller plants are dried up, and the whole country begins to look bare, with the exception of trees and bushes. Before May, showers occur occasionally, but after that time it does not rain, and they are succeeded by cloud passes over the clear sky. The first rains occur about the middle of September, and are followed by settled and pleasant weather, which lasts from twenty to thirty days; but after that time the weather becomes sultry, and the more heavy rains set in, and continue to the beginning of the winter. In summer the heat is very great, but not insupportable, as strong westerly winds sweep over the plains and cool the air. Sometimes an easterly wind continues for four or five days, that time it does not rain, and instead of a samiel, it imparts to the air a very great degree of heat. The inhabitants shut the doors and windows of their houses, and cannot sit out.

5. The Alma Dagh constitutes a portion of that extensive mountain-range which the ancient geographers called Taurus. The Alma Dagh is the antient Amanus. It lies along the boundary of Syria and Anatolia, and its crest is considered as the boundary between these two countries. The range occupies in width about 30 miles, of which the larger portion belongs to Anatolia. The mountains are very

numerous windings through the plain southward, until, in approaching the Jebel Alalha, it is lost in swampy ground, similar to that of the Bahr el Merj near Damascus. This is a marshy plain, called Zeheb, rises in a ridge of hills which run west and east, and terminate on the banks of the Euphrates south of the mouth of the Sejor. These hills compel the last-mentioned river to join the Euphrates. The Zeheb runs southward, and, by the bank of a salt lake called El Sushek, which is surrounded by low rocky hills. The lake is about six miles long and two wide. After the rains it inundates the narrow strip of land which, in the dry season, is a salt plain. But about the middle of February, when the water has been evaporated by the heat of the summer, this narrow strip is covered with pure salt, in some places two inches thick. This salt is collected in the month of August, and extensively used over a great part of Syria. The surface of the mountains is green, the brushwood and the cultivated portion of the plain, as that part of it which lies east of the river has a sandy arid soil, and is considered as forming the most northern portion of the Syrian Desert. The surface of the plain is far from being level. Short ridges of low hills occur at several places, especially near Aleppo, the plain of that town being enclosed by such ridges on three sides. When the plain extends in a level, or in slight undulations, as is mostly the case, isolated hills, called 'burchans' by geographers, are artificial mounds. In their neighbourhood there are wells and villages. The soil of the plain varies greatly in its productive powers. East and south of Aleppo it is very stony, and the earth which covers the rocks is too thin to support long-time crops and is therefore not very productive. The soil of the plain to the west and south-west of Aleppo is better, especially in the neighbourhood of the hilly range, where it yields abundant crops of wheat and other grain. To the north-west and north of Aleppo the soil is indeed stony, but the earth is deeper, and cultivation is rather extensive. In many parts now lying waste it could be cultivated with advantage, which is proved by the great number of ruined villages which occur in these parts. The Kowain was found to be 1263 feet above the Mediterranean, and that of the Euphrates, below Bir, is only 626 feet above that sea.
precipitous, and can only be traversed by beasts of burden in a few places. The most frequented road runs from Aleppo due north to Antioch, and thence over the Alma Dagh to Kasariyeh and Angora. There are said to be two or three mountain-roads farther west, in the valley of the river Eufrates, the largest of those, which fall into the Bohair, or Lake of Antiokia. The mountains are well wooded. Many thousand acers are covered with large cedars, and in other places there are firs and juniper trees.

The climate of Syria, although situated along the temperate zone, exhibits all the climates of the globe. The lower part of the Ghaur, which is more than 1000 feet below the sea-level, and is enclosed by high mountains, probably has a mean annual temperature not lower than that of the equator; but the highest elevations in the Mount Libanus and of the Jebel es Sheik are covered with snow all the year round. But no regular meteorological observations have been made in any part of Syria. Syria is subject to very violent earthquakes. In 1537 the southern districts were laid waste by a very violent earthquake, by which several towns were destroyed. (London Geogr. Journal, vol. vii., p. 101.) At other times the northern districts have suffered. In the country surrounding the Dead Sea the harvest of dates occurs in numerous places, and in others there are depressions which have the appearance of craters. Burckhardt also mentions several hot springs in the mountains which enclose the Unik on the north-east; and Pococke states that the hot springs also exist in the upper part of the mouth of the Aasy and the Gulf of Scanderoon, which however has not been noticed by more recent travellers. If this volcano really exists, it would constitute the most eastern point of the volcanic region which extends over the Mediterranean and 

**Productions.**—Wheat and barley are the principal kinds of grain which are cultivated, except in those parts which have too arid a soil, where dhurra is almost exclusively grown; rye is grown in the vicinity of dhurra sayeh, and dhurra dimiri. Spelt is much cultivated in the southern district, but very little oats, and no rye. Schubert however found wheat, barley, and rye growing wild in the plain of Ibn Omer, and hence he concludes that rye must formerly have been an object of cultivation in these parts. Rice is only cultivated on the banks of the Bahr El Houle and in the Wady Seisaboun. The common pulse are peas, lentils, the Egyptian bean, the *gifhrungayga* (Phaselous Mungan), and the gilban (Lathyrus sativus) are cultivated. Almonds, plums, apricots, almonds, apricots, peaches, and melons are grown, especially Hibiscus esculentus and Hibiscus praeceps: also artichokes, melons, especially water-melons, cucumbers, and pumpkins. Potatoes are only cultivated in some valleys of Mount Libanus, and capucins in the southern deserts.

The cultivation of cotton is very general, especially in the northern provinces, where it is of good quality. Hemp is much cultivated in some parts, but flax only in a few places. Mulberry is cultivated in central and northern Syria, and mulberry is grown in the Ghaur and on the eastern banks of the Dead Sea, but only to a small extent. The cultivation of sesameum and of the castor-oil plant is much attended to: the oil of both is generally used for burning. Tobacco is grown in many places; and in some, especially along the sea north of Akka, it is of excellent quality, and furnishes a considerable article of export to Constantinople and other countries.

The cultivation of fruit-trees is much attended to. Some is kept, as the fig-tree, in the northern portion of the table-land of Judaea, the olive along the coast of the Mediterranean and in the neighbourhood of Damascus, the mulberry-tree on the western declivity of Mount Libanus and the Jebel El Aynny, and the pistachio-tree on the snyh is surrounding Aleppo. Almonds are numerous in the more mountainous districts, and also on the table-land of Judaea. The wine made on Mount Libanus is of excellent quality. Dried grapes and dates are considerable articles of internal commerce. Other fruits are almonds, apricots, peaches, pears, plums, and melons.

Dates are at present found in abundance only in the Plain of Akka: at Jericho, the dates of which were formerly celebrated, only a few trees occur. The zakkum and barb-tree, the Indian fig, the mulberry, and the pistachio-tree.

The forests on the mountains consist of cedars, firs, and pines. Those of the table-lands chiefly consist of several kinds of oak, which however do not attain a large size. They produce however the best galls that are known. There are also the cork-ol (Crataegus azarifza), the sour-ol, the new-berry-tree, the street, the Juniperus Sabina, and Juniperus Phoenicea. Much scammony and sumach is gathered in the forests of Mount Libanus as articles of export.

The domestic animals which Syria has in common with England are horses, cattle, asses, sheep, and goats. Few horses are kept by the agricultural population: but the wandering tribes, the Arabs, Turkman, and Kurs, pay great attention to the breed of horses. The breeds of the horses of the upper and lower hands are very different; the Kurs is a mixture of the two. The Arabian horses are noted for beauty and speed. *The number of cattle is comparatively small, and, except in a few places, of small size. The asses and mules are of a large breed, and they serve as substitutes for horses in the transport of goods. Sheep and goats are very numerous. In many parts, especially in Northern Syria, that species is kept which has the large broad tail: there are camels and buffaloes. Camels are generally kept by the Beduin tribes. There are also numerous, which are more than 6000 feet above the sea. Some of the Beduin tribes whose pasture-grounds are indifferent, which is the case with most of those who live to the east of the Dead Sea, have no animals except camels, and live on their produce. Buffaloes are found on the foot of the Alma Dagh, larger and generally carry a weight of 300 pounds; while the Arabian camels carry only 600 pounds. But the Arabian camels bear heat and thirst better than the Tartar camels, and are more useful in many parts. Buffaloes are only found on the sea-coast, between Beyrut and Tarabulus, in the Wady Ghab. Those which are kept on the sea-coast are much larger, and not inferior to those of Egypt. Beasts of prey are not numerous, with the exception of jackals, foxes, and hyenas, which are frequent in some parts of the desert mountains. There are bears on Mount Libanus and Antilibanus. Wolves are only found in the forests of Alma Dagh, and wild boars are very frequent in many parts. Deer are met with on the Alma Dagh and near Mount Tor; and in the desert parts are several kinds of antelopes: the most common is the Antelope hinnuus. In the mountains of the Beika the bouquetin of the Syrian and Tyrol Alps, even in parts of Libanus, is numerous. Hares and porcupines abound, and the dipus jerboa is common in the southern deserts. There are several species of eagles. Partridges and pigeons abound in many parts, as also ducks. The goats of Antilibanus are distinguished. In the interior parts of the Southern Valley there are immense numbers of fish, called kattha, which is considered to be the Tetrao Akkata. Several kinds of fish and shell-fish are found in the Mediterranean, but not in large quantity; but a considerable quantity of shell-fish is brought from Syria, and is sold in the markets, especially in the fish, called black fish (Macropterus niger), is so abundant, that annually, between October and January, a great quantity is taken, cured, and sent to remote places. This fish is from five to eight feet long. Fish are also very abundant in the Bohair. The Mediterranean is the Atlantis fragilis, or common purple shellfish. The tortoise, (Testudo Graeca) occurs frequently on the table-land of Judaeas, and turtles in the Barrada, or River of Damascus. None of the snakes is so poisonous as those in Egypt. Bees are very abundant on Mount Libanus, and honey and wax are exported. The rearing of silk-worms is carried on to a great extent on the mountainous tracts near the coast, and silk constitutes the most important article of export from Syria. The locusts are frequently found in the fields: the Arabs eat them, and salt them for food. There are no metals found in Syria except iron, which is worked in the Keosoun in Mar Hanna, west of Beirut, where also coal has lately been discovered. Burckhardt found iron in numerous localities. Of copper, nothing is noted. Salt is got from the lake called El Sabh, and also from the sea-water of the Mediterranean. In the Tyb Beni Israel, and at the southern extremity of the Dead Sea, there is salt which is very coarse. The most rare commodities, men, or asphaltum, is collected on the west shores of the Dead Sea. Burckhardt was told that it comes from a mountain on the eastern side of the sea, and south of Wady
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their herds in the Umk from the end of September to the middle of April, when they go to the mountains, and by degree advance as far north as Al Bostan and Gurun and the mountain-ranges in the vicinity of these places, which are more than 100 miles from the parts where they spend the winters. They are a people of great advantages from the water supply, and good grass and goats, and a few cattle. Their women are very industrious. They make tent-coverings of goats' hair, and woollen carpets, which are inferior only to those of Persian manufacture. They have also made great progress in the art of dyeing. Their houses are very beautiful, and they employ indigo and cochineal, which they purchase at Aleppo. The brilliant green which they give to the wool is much admired, and is produced from some herbs which are gathered in the mountains. The Turkish Einbaniya pay much attention to the education of their children, but Bureckhard thinks that out of fifty hardly one can read or write. They are not immediately dependent on the Turkish pasha, being tributary to Talahan Oglu, the powerful proprietor of the eastern part of Anatolia, who resides at Yungat, to whom they pay an annual tribute of 6215 piastres in horses, cattle, and other things. The internal affairs of the nation are conducted by a divan, composed of the chiefs of the thirteen minor tribes into which it is divided.

The Kurds who inhabit Syria are evidently a tribe that emigrated long since from Kurdistan to the mountain-range which traverses Western Asia west of the lake of Van, between 35° and 39° N. lat., whence they have gradually advanced to the Alma Dagh. Kurds are almost exclusively in possession of the western portion of that range, from which they descend in summer to the plains east of Aleppo. There are also some Kurds in the northern districts of Mount Libanus, who have however the habit of the mountains. Burckhardt observes that these Kurds bring annually from Syria to 20,000 to 30,000 sheep from the mountains of Syria, as Syria does not produce a sufficient number of sheep for the consumption of the inhabitants. After visiting the large towns with their flocks, they take to Mount Libanus those which they have been unable to sell, in order to pasture them there until they find an opportunity of selling them in that mountainous district, where few sheep are kept by the Kurds as they are too permanently scattered. The Kurds of the Alma Dagh, cannot properly be called a nomadic nation, as most of them live in villages, are stationary, and occupied in agriculture and culture of the inhabitants. There still is a considerable number of families that change their abodes according to the seasons, in order to procure pasture for their cattle. The Kurds have a language of their own, which, according to Bureckhardt, is a mixture of Persian, Armenian, and Turkish.

4. Divisions and Towns.—Syria is divided into four eyalets, or bashkals, of which, Akka and Tabaréus, extend over the countries on the shores of the Mediterranean as far north as 35° 45' N. lat.: the third, Aleppo, occupies the most northern part, from the Mediterranean to the banks of the Euphrates, and extends thence to the south as far as Isat, and the fourth, Damascus, the interior of the country south of 35° 45'.

1. The Eyalet of Akka, better known in Europe by the name of St. Jean d'Acre, to which the eyalet of Gaza was added at the beginning of this century, occupies the whole coast from the boundary-line of Egypt to the Bay of Junie, or Kersouan (33° 55' N. lat.), and extends over the plain of Falastin, Mount Carmel, the plain of Ibn Omer, the hilly region of Mount Sion, the plain of Akka, and the Bekas and Bi'el Bala'bec. The southern districts of this eyalet are partly sterile and partly of indifferent fertility: the central districts are rather fruitful, and the northern exhibit a considerable degree of fertility, and in many places they are well cultivated. The greater part of the silk and wool exported from Syria is collected in these countries. In Mount Libanus there are rich mines of iron, and in their vicinity coal has lately been discovered. The most remarkable places from north to south are Akka, a thriving town containing, according to Dr. Robinson, 15,000 inhabitants; Jaffa, or Joppo, a town with about 4000 inhabitants, which has a harbour, which is so choked up with sand as at present to admit only small boats; the roadstead also is dangerous, the anchorage is insecure, and the two large rocks: the town is built on a ledge of land with a wall, in which there are unequal intervals. It has no commerce, but is the common landing-place of the pilgrims who go to Jerusalem, of which place it may be considered the port.

Ramléh, or Ramaz, east-south-east of Jaffa, lies in a fertile and well-cultivated plain: it has 15,000 inhabitants, who do not emigrate in the same manner as from Joppo to Jerusalem, which passes through this town.

Kaisariyéh (Cesarea) has formerly a harbour, which at present is filled with sand: it was once a large town, as the extensive ruins still prove, but it is now nearly uninhabited.

Tantura has a harbour for small boats, and carries on some commerce with Egypt, from which it receives rice and linens: it exports cattle and fruits.

Kafir, or Haffa, is a small place built on a bay formed by Cape Tabaréus, and the bay has little depth of water, and admits only boats.

Akka, or St. Jean d'Acre. [Acre, vol. i. p. 98.]

The ancient Tyrrus, is built on an isthmus about 400 feet wide, which is supposed to have been formed by the embankment that Alexander the Great made for the purpose of taking the ancient town, the site of which is now uninhabited, and consists of a rock covered with brown earth. The harbour has been filled up with sand, and the roadstead is unsafe, but it is better than that of Jaffa or Safid. The population amounts to 3000 individuals, most of whom gain their livelihood by fishing and agriculture. It exports tobacco, wax, and fire-wood.

Jezireh, or Zeidi, the ancient Sidon, is built on high ground, and overlooks the present bay. The streets in the upper town are narrow and dark, but in the lower part of the town they are wider. Its harbour was filled up by Fakr-ed-Din, in the last century, and at present admits only boats. About 15,000 inhabitants are there to be seen, who live on 15 feet above the sea-level, and 500 feet long, at the end of which is a small fortress. It has safe anchorage during the prevailing south-western winds, but it is exposed to the northern gales. The town has between 7000 and 8000 inhabitants, and several dyeing-houses: large quantities of silk are exported.

Beirut. [Birkut.]

Junie is a small town with a landing-place for small boats: it carries on some commerce with the island of Cyprus.

In the interior are the following towns:

Nazareth, or, as it is now called by the natives, Nazanah, is built in a beautiful valley which opens into the plain of Ibn Omer, and is in one of the most fertile and best cultivated districts of Galilee. It has about 2000 inhabitants, and a fine church.

Tabaréus, the ancient Tiberias, is on the banks of the Bahr el Tabaréus, on a small plain, surrounded by mountains, over which the land is entirely built wall. It contains about 4000 inhabitants, who have some commerce with the Beduins of the Ghaur, and of the country north-west of the town. It is a place of pilgrimage for the Jews, who constitute about one-third of the population. It is the head of the south as far as 35° 40', which is the exception of a few Christians. This place was nearly levelled to the ground by the earthquake of 1837.

Safed, nearly due north of Tabaréus, is a nearly-built town, situated round a hill, on the top of which is a Saracen castle. It contains 600 houses, of which about 150 are inhabited by Jews, who consider this one of their holy cities, and about 100 houses by Christians. In the neighbourhood there are large plantations of olives and vineyards. There are some manufactures of cotton cloth, and dyeing-houses. The population is between 6000 and 7000. This place also was almost destroyed by the earthquake of 1837.

Zahle is in a narrow valley, at the eastern base of Mount Libanus, which opens into the Bekas. It contains from 2000 to 2500 inhabitants, who are almost exclusively inhabited by Christians, who make much cotton cloth and some woolen stuffs. They have 20 dyeing-houses, and a considerable trade with the Beduins of the Bekas.

Beit el Karkh. [BALBEC, vol. i. p. 160.]

Deir el Karkh, the capital of the emir of the Druses, south-east of Beirut, in a valley of Mount Libanus, is a considerable place. [Darvus, vol. ix. p. 160.]

2. The Eyalet of Tabaréus, the smallest of the political subdivisions of Syria, is the easternmost island from the Bay of Junie to Cape Possidi, about 12 miles south of the mouth of the river Azy, and comprehends the northern and more elevated portion of Mount Libanus, the plain separating the
mountain from the Jebel Anzezry, and the largest portion of the last-mentioned range. The whole of it, with the exception of the plain, is fertile and well cultivated. It produces silk, tobacco, oil, fruits, galls, and wax, for exportation. But the principal products of the mountains are Anzezry, and Ismanlia: the two last-mentioned tribes are only found in the Jebel Anzezry, where the emir of the Anzezry lives in the small town and castle of Szafita. The following are the chief places in this eyalet, from south to north:

Maine Berdje, a small harbour, and a still smaller town, which has some commerce with Cyprus, and receives from that island wheat and salt.

Jebali, the antient Bybulis, is a small town, enclosed by a wall, which has a small harbour, and carries on some commerce with Cyprus.

Batoun, the antient Bostris, is a town consisting of from 300 to 400 houses, mostly inhabited by Maronites. There is no harbour, but an artificial inlet has been formed in the rocks, which admits a few coasting boats. It has no commerce: excellent tobacco is grown along the shores of the Mediterranean.

Tarlabiss, the antient Tripolis, called by the Arabs Tarlabis-bol, is situated on a hill about half a mile from the port, on the coast opposite to the town of Latakia, in the district of the Levant, is surrounded by several ranges of hills, and contains some 3000 inhabitants, who cultivate the land, and have some commerce with Syria and Egypt. It has a small harbour, and is called El Myn, and is itself a small town, inhabited by sailors and shipwrights. This town is formed by a line of low rocks stretching from the western side of Myn about two miles into the sea, towards the village of El Ask, and running from north to south. About a mile to the south of the town there is a line of small islands, the farthest of which is about ten miles from the mainland. The exports consist of a large quantity of silk, tobacco, and gossamer. The latter is gathered from the Anzezry mountains, yellow wax from Mount Libanus, madder from Hamah and Hema, scammony and tobacco. The tobacco goes to Egypt.

Jebili is a small town, in the neighbourhood of which much tobacco is grown, which is exported to Latakia. There is a small port.

Latakiah, called by the natives Ladekiya, the antient Laodicea, stands on the northern edge of an elevated tongue of land, called Cape Zarat, which advances nearly two miles beyond the mouth of the river, and has a beautiful plain. The houses stand on a hill, the port having a flat rock. The port, called Scala or Marrina, is about half a mile from the town, and separated from it by gardens and plantations. The harbour is narrow and shallow, but it is however well sheltered, excepted to the west. It admits only vessels of 100 tons burthen. The chief exports of this place are tobacco of excellent quality, most of which goes to Egypt, cotton, raw silk, and wax. The imports are rice from Egypt, wine from Cyprus, and assorted goods, especially hardware, from England.

Mount Libanus is Kanobin, a convent, the seat of the patriarch of the Maronites. In its vicinity are the famous ceedars of Mount Libanus. About a mile and a half from the site of the convent, in the midst of gardens and plantations, and most of them have flat rocks. The port, called Scala or Marrina, is about half a mile from the town, and separated from it by gardens and plantations. The harbour is narrow and shallow, but it is however well sheltered, excepted to the west. It admits only vessels of 100 tons burthen. The chief exports of this place are tobacco of excellent quality, most of which goes to Egypt, cotton, raw silk, and wax. The imports are rice from Egypt, wine from Cyprus, and assorted goods, especially hardware, from England.

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Damascus. In its neighbourhood are the ruins of Amman, or Philadelphia. Kerek lies in the northern district of the Shera Mountains, and is built on the top of a steep hill, which is surrounded by a deep, narrow gorge. The town is inhabited by about 400 Musulman and 150 Christian families, who live on a footing of equality, are independent of the government, and masters of that part of the mountain-region, which is inhabited by a tribe of Beduins who are dependent on the chief or sheik of the town, who has a very limited authority within the place itself. It appears however that during the Egyptian administration, Szait, as well as Kerek, has again been subjected to a strict obedience to government. The population is agricultural, and tends sheep, goats, mules, horses, and camels, and are engaged in the transport of the Hadji road, which is about 15 miles east of the town. Taiylé is in the centre of the Shera Mountains, on the declivity of a hill, in a country abounding in springs and rivulets, and full of plantations of fruit-trees. Figs, wool, butter, and hides are sent to Gazal. The town contains about 100 houses, but suffers much from the exactions of the Howielat Beduins, the authority of the Turkish government being very small. The town of Maan stands on two small hills on the desert-tableland which surrounds the mountains of Carmel. It consists of about 100 houses on both sides of the Hadji-route, which divides the town. There are several springs, by means of which the extensive plantations of figs, pomegranates, apricots, peaches, and plums are watered. No corn is grown in these parts. The principal crops are grapes and hops, which are sent to Damascus. The town was engaged in the manufacture of dyew- and the trade of ivory, for it is mentioned by the prophet Ezekiel (chap. xxvii, 16 and 18), at a time when probably no manufactures existed in any part of Europe.

We may even conjecture with some degree of probability that the extensive church trade, which the Phoenicians carried on in ancient times was founded rather on the manufactures of Damascus than on their connection with India, or any other country of Asia. The Phoenicians were probably supplied from Damascus with a great number of manufactured articles for the markets of the countries of the coast of the Mediterranean, and they supplied the manufactures of Damascus with some of the materials used in them. The extent of the manufacturing industry of this town may be conceived from the statement of Schubert, that about 60,000 persons are employed in making silk stuffs, especially damasks and brocades; and that caravans frequently go from Damascus to Haleb, which take no other goods but articles of this description. A considerable number of persons are also engaged in the manufacture of carpets and linens, and there are numerous tanneries. The manufacture of saddles and horse and camel trappings is also important: these articles are sent to a great distance, being highly prised all over the East. The workmen in these manufactures use silver and silk thread. Many others work in copper and iron; and though the swords-blades of Damascus have not at present that reputation which they formerly had, this seems more the effect of the improvements which have been made in the manufacture of swords in other places, than of a deterioration in the manufacture of Damascus. There are several extensive tobacco-manufactures and soap-houses; and also a great number of workmen in ivory and precious woods. The number of persons who make perfumes, aromatic oil, &c., of which the inhabitants of the East are very fond, is much larger than in any of the manufacturing towns of Europe.

From the account of Schubert it appears that there is a branch of manufacturing industry at Damascus, which is hardly known in Europe, that of ready-made dishes, of cake, and all kinds of confectionary and pastry, which are sent to remote places, and even find a sale among the Beduin Arabs. This account is confirmed by Poujoulat, who stated that there are more than 400 cooks in Damascus. Poujoulat has given a list of the principal branches of manufacturing industry in Damascus. (Damasc., vol. viii, p. 296.)

The manufactures of Haleb are small compared with those of Damascus, and mostly limited to cotton and silk stuffs, and gold and silver lace. It must also be observed that these branches of the manufacturing industry are practised on in most of the small towns, and even in some villages, such as cotton stuffs for gowns and shirts, the dyeing of cotton, mostly blue and red, tanning leather, and making soap. Such places however supply only the neighbouring, and the manufactures are sent to them in the form of articles, and they rarely if ever work for a distant market.

Commerce.—The commercial intercourse between Syria and Europe is very small. None of the agricultural products of Syria are in demand in Europe. The only article which is imported, with but one exception of rice, with which Syria is supplied from Egypt. The manufactured goods of Europe are not in demand, not being adapted to the taste and customs of the East. The only article which is imported to a certain extent is hardware, which is almost exclusively supplied by England: some French cloth is also imported. The chief articles sent from Europe to Syria are supplied by the East and West Indies, and consist of indigo, cochineal, and coffee. The consumption of coffee from the West Indies is very considerable, and the coffee factories are the beginning of the present century. Very little sugar is imported: the deba, an extract from grapes, is used as a substitute for it in most parts of Western Asia; and this article is made in Syria to a great extent, and of the best quality: it is exported to all parts of Western Asia and to Egypt. The most important article of export to Europe is silk, which probably amounts to 2000 bales of 200 lbs. each; a fact which shows to what extent this branch of industry is carried on. Damascus sends to Europe, probably a much greater quantity is consumed in the manufactures of Damascus and Aleppo. Other less important articles are gall, olive-oil, sponges, fruits, and tobacco. The fruits, which are principally exported, are dates, raisins, figs, almonds, dates, cherries, &c.; of these the dates are sent to a great extent. There is some maritime intercourse between Syria on one side, and Egypt, Cyprus, and the coast of Caramania on the other. It is carried on by small coasting-vessels, which are best adapted to the shallow and narrow harbours of the Syrian coast. The exports consist of great quantities of agricultural products, and to the exportation of soap and some cotton stuffs. Syria receives chiefly live stock and tobacco, for which it pays with rice.

The commerce between Syria and the countries to the east is said to be considerable; but we have no information by which we can form an estimate of its amount. We only know that at all seasons of the year numerous caravans are on the road going or returning from these parts. This commerce is concentrated in Aleppo, as the chief line of communication between the towns of Damascus and Haleb. The road from Haleb to the Euphrates is almost impassable, and is also in the possession of the powerful tribe of the Alene Beduins, so that a caravan rarely passes directly from Damascus to H Aleppo by the way of the roads of Palestine. It may be said that this route is almost entirely abandoned, and the manufacturing goods go from Damascus to Aleppo, whence they are carried to Anatolia and Constantinople, and to Mosul, Bagdad, and Basra. Two well-frequented roads lead from Aleppo to Constantinople, one by the Euphrates and the other by the great road from Aleppo westwards to Antiochia (Antakhi), and thence through the Italian Pass to Scanderbo, whence it runs along the shores of the Bay of Scanderbo to Adana. From this place it ascends the elevated table-land of Anatolia, and passes through the magnificent remains of several fortifications of the Byzantine period until it reaches the Sea of Marmora at Ismid. The eastern commercial road runs due north from Aleppo, and traverses the chain of the Alma Dagh between Antab and Al Bostan, and runs in a south-westerly direction to the coast, reaching the Sea of Marmora at Ismid. From this place the road divides; one branch, running north-east, leads to Sivas, Tokat, and Amasief, and the other continues in a north-east direction to Angora, and thence to Ismid and Constantinople. Two roads lead from Aleppo to Persia. The first runs towards Diarbekr, where the road runs north-east to Bir, where the Diarbekr is in Syria, and from which place to Orfa it continues westward. The northern road leads from Orfa to Diarbekr, where it passes
the Tigis, and thence goes over a very mountainous district, beginning at Orfa, and passing through Mardin, Nisibin, and Mardin, and thence through Karkuk, Kirmahana, and Hamadan to Teheran. This road is also sometimes used by the Bagdad caravans, which then proceed from Mosul through Samarah to Bagdad. But the most frequented caravan-road between Aleppo and Bagdad is that which goes along the south-eastern direction through the northern and less desert part of the Syrian Desert, which it enters after leaving the El Sabkh, or Salt Sea. It reaches the banks of the Euphrates at Annah, and runs along it to Hit, where it crosses the river and then goes due east to Bagdad, or continues south-east by Hilla to Basra.

It has been said that no account has been given by any traveller of the country between 33' and 33' 20" N. lat. on the west of the Southern Valley. But Dr. Robinson has lately traversed this country obliquely in his journey from Safed to Sur, and he says that this tract is distinguished by peculiar features. After having crossed three valleys, he entered a wide plain by a considerable ascent. Volcanic rocks brought from the crater of a volcano, and the lowest part of which was occupied by a lake. The whole tract was the same with that which he had ascended into another basin-like plain of smaller extent, which was cultivated and surrounded by bushy hills, and separated by a valley from a high undulating table-land, the soil of which was fertile and cultivated, and which was enclosed by a ring of bushes and shrubs. The whole country was watered by the Euphrates. (Polot., v. 16.) Herodotus, in speaking of Palestine, includes it in Syria, as a subordinate division: he calls it "the Palestine Syria." (4) Polaestria, ii. 106.) The Syræa (the inscriptions of Phoenicia and Palestine under the name) derived their descent from Aram, the youngest son of Seth. (Gen., x. 22.)

**History of Syria to the death of Alexander the Great.**

The earliest records of the state of Syria represent it as consisting of a number of independent kingdoms, of which the following are mentioned in the Bible:—(1.) Aram of Damascus (1 Sam. viii. 6; Isaiah, viii. 7; xiii. 3; Amos, i. 5) was always the most powerful city, and in some sense the capital of the country. Its kings were frequently engaged in war with the Jews. (2.) The city of Damascus, in the neighbourhood of Bashan, had a king in the time of David (2 Sam., x. 6). (3.) Gerash (1 Sam., iii. 3; xiii. 37; xiv. 8,) had still a king in the time of Solomon. (4.) Aram of Beth Rechob (2 Sam., x. 6) was a district at the foot of Anti-Libanus, named after the town of Rechob, in the neighbourhood of the town of Dan, or Leah, in the territory of Naphtali. (5.) Aram of Damascus (1 Kings, ii. 23). Besides these, the towns of Hamath, Helbon, Riblah, Tadmor, Betheden, Berothai, Mash, and others, had probably their own princes.

The conquests of David (c. 1055 B.C.) brought these states into submission to the kingdom of Israel, but they again became independent at the close of Solomon's reign (c. 975). From this time the kingdom of Damascus especially is frequently mentioned in connection with the history of the Israelites, and it appears gradually to have grown in power, until it had supplanted the other states of Syria (1 Kings, xx. 1), and even to have given the kings of Israel great trouble, till the reign of Josiah (c. 650 B.C.), who obtained considerable successes against Benhadad (2 Kings, v. 29). The last of its kings in the Bible was Rezin, who having engaged with Pekin, king of Israel, in war against Ahaz, king of Judah, Ahaz invited Tiglath-Pileser, king of Assyria, to attack Damascus, which he took, and carried the inhabitants captive to Kir (2 Kings, xvi. 7), about the year 740 B.C. (Clayton's Bible Historical, i. p. 273-4.)

From this time Syria formed a part of the Assyrian, Babylonian, Persian, and Macedonian empires in succession, but during this whole period, down to the death of Alexander the Great (c. 323), its history presents nothing worthy of notice. **Syria under the Seleucids, down to its subjection to Rome.**

The wars between the generals of Alexander for the possession of western Asia, and the battle of Ipsus (b.c. 301), Syria, with the exception at first of Coele-Syria and Palestine, fell to the share of Seleucus.
Nicator, and henceforth it became the central portion of the kingdom of the Seleucidæ, the usual abode of the kings being at its capital, Antioch. A list of the kings of this dynasty is given in an article Syria, and the histories of their reigns under their respective names. For the relations of Palestine and Syria during this period, see Jews, Maccabees, Aramonians. The empire of the Seleucidæ was destroyed, and Syria was declared a Roman province by Pompey in 63 B.C. The district of Jerusalem was left for a time under its own princes. [Comment.] During the civil wars of Rome, Syria suffered much from the conflicts of the two parties, the power of native robbers, and the internal ruin occasioned by the reign of Augustus that it became quietly settled as a part of the Roman empire. It was governed by a proconsul, who commonly resided at Antioch. In the year 6 a.D. upon the banishment of Archelaus, Judæa and Samaria were added to the province of Syria, to which they henceforth belonged, with a short interruption during the reign of Herod Agrippa I.

Ancient Divisions of Syria.—Under the Macedonian kings, Syria was divided into four parts (tetrarchies), which were named after their capitals, Antioch, Seleucia, Apamea, and Laodicea. Both the Greeks and the Romans called the northern portion of Syria, that is, the whole country with the exception of Coele-Syria, Phœnicæa, and Palestine, by the name of Upper Syria (ἡ ἐπάνω Συρία). Lower Syria Superba (ἡ κατάκτησις Συρίας) or Syria Sogdiana (Σωγδιανή Συρία), that is, the Hollow Syria, which was the name given to the valley between the ridges of Libanus and Anti-Libanus. Under the Romans the province was divided into nine districts: Cassiota, Apamea, Seleucia, Seleucia Commune, Commagene, Chalybeites, Palmyra. The following were the chief towns:—1. In Cassiota, which lay along the coast, between Mounts Casius and Libanus, and touched Phœnicæa on the south; Gabaala (Jebelli), a sea-port; farther north, Antaricia, formerly called Antioch. 2. In Apamea, which lay east of Phœnicæa and Cassiota, along the course of the Orontes: Emesa (Homs), near a lake formed by the Orontes, celebrated for its temple to Eshmun, which was made into a Roman colonia, named Antioch [παλαιάντίωλος], for the defeat of Zenobia, by Aurelian, and for its defence against the Arabians (A.D. 635); Arethusa (Rostan); Epiphanias, the Hamath of the Bible and the present Hamah; Apamea, formerly Pella, and now Kalat el Medik; Seleucia, on the Belus (Sehjuré?); Antioch. 3. In Chalcedic, which lay east of the Orontes, toward the desert; Chalea, the ruins of which still exist near Kineret. 4. In Seleucia, north of the mouth of the Orontes, on the sea, the ruins of which are Seleucia, or Swediyah. 5. In Pieria, which lay on the Iassicus Sinus (Bay of Scanderoon), and reached on the north to the Syrie Pylae, the pass which divides Syria from Cilicia: Alexandria (Scanderoon). 6. In Commagene, which occupied the northern boundary of the country. 7. In Emessa: Sinus (Tigris) and the Euphrates: Samosate (Samassat) on the Euphrates, the birth-place of Lucian, and of Paul the heretic; Adara, afterwards called Gerasimæ, and in Latin, Germanica Caesarea, in honour of the emperor Carus, at a later period Jerusalem, and now Chasedah, or Massa; Nelcha, or Nolchah; Chalcedon, or Marsh; Dolichia or Dolicha; Antioch at the Taurus, perhaps Basha). 7. In Cyrrhestica, which extended from the plain of Antioch eastward to the Euphrates: Zeugma, where there was a passage over the Euphrates, opposite Bitha (Birt); Arudis, at the mouth of the Marasya; Hiera polis, formerly Mobag, which name the Greeks turned into Hamaheye (Ommed), now in ruins at Marshebe, one of the most important cities of Syria, and famous for a temple of Atarit, Beroea, formerly Chalba, and now Khalka, which was the most important town of modern Syria [Halhe]; Gindara (Gündarjeh), a mountain fortress, where Venustius defeated the Partisans. 8. In Chalbitusinis, which was anciently a fertile strip of country between the Euphrates and the Tigris, on the west bank of the delta, but is now swallowed up by the desert, the sands of which cover the ruins of its cities: Thapsacus, the Tiphasch of the Bible, afterwards Amphipolis, and now the little town of Der, on the banks of the Tigris; Fortuna, which was Zebebel (Zebel), from which some geographers identify with Thapsacus. 9. In Palmyra, the southeastern portion of the country, which, like Chalbitonitis, was once partially irrigated and cultivated, but is now a part of the desert; Palmyra, the Tarbus of the Bible, built by Solomon, according to Josephus, the splendid ruins of which still exist near the little village of Tadmor. These ruins, which belong to the period of the Roman empire, are described under Palmyra. Palmyra and Palæstina are described in separate articles.

Diocletian extended the boundaries of Coele-Syria, and added to it Phœnicæa, under the name of Phoeboica Libanitis. Constantine the Great erected Commagene, and divided the tracts of Euphratensis, and Theodosius II. divided the remainder of Syria into Prima and Secunda. Antioch was the capital of the former, and Apamea of the latter.

Rusticus and the Later Roman Emperors.—Under the Caesars Syria was one of the most populous, flourishing, and luxurious provinces of the empire. It had a considerable commerce, and formed indeed the emporium which connected the Eastern and Western quarters of the world. Hadrian, upon his accession (117 A.D.), further increased the eastern boundary of the empire at the Euphrates, and henceforth the frontier province of Syria was exposed to repeated invasions, first from the Parthians and afterwards from the Persians. The province was overrun, and almost reduced by Sapor (A.D. 248), from whom it was rescued by Odenathus (261-264), whose elevation to a share in the empire by Gallienus, his death, the attempt of his widow Zenobia to establish an independent sovereignty in the Eastern part of the empire, and her defeat by Aurelian (273 A.D.), are related under Syria, Provincia Myra.

At the end of the third century, and in the fourth, the Saracens, or inhabitants of the Arabian deserts, who were destined to wrast this valuable province from the empire, were, though a barbarous and insignificant people, more a terror to the Romans than to the Persians, at least, though it must not be asserted that they were more often among the enemies of Rome. But before falling under their arms, Syria once more felt the power of the Persians. In the reign of Phocas, Chosroes II., after reducing Mesopotamia and the neighbouring states, crossed Euphrates at Alcharam, and finally Antioch, which he almost completely destroyed (A.D. 611). Heraclius, who had obtained the empire in 610, took the field in 622 against Chosroes, who had in the meantime conquered not only Syria, but also Palestine (614), Asia Minor and parts of Thrace. Their victories were a series of brilliant campaigns: Heraclius repeatedly defeated Chosroes, and at last drove him beyond the Tigris (A.D. 627), and Siroes, his son (and by the murder of his father, his successor), made a treaty of peace with Heraclius (A.D. 628), one of the conditions of which was that he should keep the 'sacred cross,' which had been carried into Persia after the sacking of Jerusalem in 614. But this brilliant recovery of the Eastern provinces was only the prelude to their final loss.

Conquest of Syria by the Saracens.—The history of this period is related by Gibbon, in the 51st chapter of his Decline and Fall. His account should be compared with the notes in Milman's edition of that work, and especially with his note on the 'Seyr' of the Arabs. A large army of Saracens assembled at Medina, whence they marched into Syria under the nominal command of Abu Obeydah, but virtually led by the fierce Khaled, ' the sword of Allah. They first attacked Bosra, on the east of the Jordan, which was in possession under Abu Arab. They then laid siege to Damascus (A.D. 632). The defence was obstinate, and in the meantime Heraclius had assembled an army of 70,000 men at Emesa, under the command of his general, Vardan. The armies met at Aizanadin, the Arabs were utter routed, and the Arabs returned to the siege of Damascus, which fell, after an obstinate resistance, in 634 A.D., about July or August. After some irregular exploits, which served to show the undaunted valour and fanaticism of Khaled, and to strike terror into the Syrians, the Saracens passed over the Euphrates into Mesopotamia, first of Helopolis and Emesa, and then of other important towns. In the meanwhile Heraclius had prepared for a last effort in defence of Syria. An army of 80,000 men was sent to Antioch, and a fleet, which was drawn up opposite the mouth of the Euphrates, was commanded by a light armed force of 60,000 Christians and Arabs, commanded the Mohammedans on the banks of the river Yermuk; but few Christians escaped from the field of battle (A.D. 634). Henceforward the conquest proceeded with but little opposition. The sacred character of Jerusalem procured for it an
honourable capitulation, which the caliph Omar himself came from Medina to receive (637 A.D.). Aleppo submitted, but the castle offered an obstinate resistance, and was taken by surprise, and Antioch purchased its safety at the expense of obedience and 300,000 pieces of gold (a.d. 638). In the same year Heraclius died from Constansople, and after a show of resistance at Caesarea by Constantine, his eldest son, the province was abandoned to the Saracen, to whom the remaining cities at once submitted. (Compare the map of Levant, p. 467.)

**Syria under the Khalifs.**—Under the Ummeyyads, or Ommiads, the seat of government was at Damascus, whether it was removed from Kufa by Moawiya, who reigned from 656 to 679, but it lost this distinction in 745, when the Abbasid caliph declared the seat of government at Baghdad. For more than nine centuries the history of Syria has been to a great extent included under that of Egypt. [EGYPT.] It was subjected with the latter country to the Turkish usurper Ahmed Ebn e Tooloon, who founded the dynasty of the Toulounides, which lasted from 688 to 906 A.D., when the Khalif Muktace recovered both countries; and afterwards to another Turkish usurper, Aksheh Mohammed Ebn Tughby (a.d. 936), whose dynasty lasted till 976, when he was expelled from Syria by his son. This pressure of the Turks, and soon afterwards Syria, as far as Damascus, and founded the dynasty of the Fatimite caliphs, whose capital was at Cairo. [FATIMIDES.] In 1076 the Turks invaded Syria and Palestine, took Damascus and Jerusalem, and established the throne of the9th century for a time in the person of the compound of the house of Ortok. The Caliph Mostali retook Jerusalem in 1096, but lost it again, with a large portion of Syria, in the first crusade, at the close of which the Christian kingdom of Jerusalem was established, which included the ancient Palestine and Syria, and lasted till the 13th century. (See Crusades, a.d. 1187, when Salah-ed-Deen (Saladin) recovered it. [CRUSADES; SALAH-ED-DEEN.]) His dynasty, the Eyyoubides, lasted till 1176, when it was destroyed by the Fatimite ruler of Egypt, and Damascus by the revolt of the Baharite Memlooks. Seif-ed-Deen, the sultan of Aleppo, great-grandson of Salah-ed-Deen, recovered Damascus, but he was overthrown and slain in an invasion of the Moguls from Persia, 1260. The middle Ayyoubide period was the first contact of the western world with Syria in the twelfth and thirteenth centuries, see Crusades.

Syria continued subject first to the Babaris, and then to the Circassian Memlooks till the overthrow of the latter by the Turks in 1516-17. (MAP OF THE EAST.) Then passed Euban on, the country was however interrupted for a short time by Timur, or Tamerlane, who invaded Syria and sacked Aleppo in 1406, and in the year 1693 restored Damascus. He did not however attempt to keep possession of Syria, and the Turks soon after retook the country. Sultan Selim I. It is still under the power of the Porte.

In the later history of Syria there is nothing worthy of notice but the petition from Napoleon, a.d. 1799. (BONAPARTE, Vol. v. p. 124-5.) In the year 1831, Mehemet Ali, the present viceroy of Egypt, having formed the design of erecting Egypt and Syria into an independent kingdom, took up arms against the Porte on the pretext of a dispute with the pasha of Damascus. His son, Ibrahim Pasha, invaded Syria, and took Gaza in October, and on the 9th of December attacked Acre. After a vain issuing a firman, commanding Mehemet to withdraw his forces from Syria, the sultan declined war, but afterwards offered to send his son, Ibrahim, assisted by French and English officers and Greek sailors, and having formed an alliance with the chief of the Druzes of Lebanon, took Acre on the 21st of May, and Damascus on the 12th of July. On the 7th of July he defeated the army of the sultan at Hemas, took Antioch on the 1st of August, and on the 21st of December utterly routed the forces of the sultan at Koniah in Anatolia, taking the grand vizier prisoner, and then pressed on for Constantinople. It was the end of 1821, when the sultan, who had passed the winter in Syria, was forced to conclude peace with Mehemet Ali, on the 4th of July. On the 16th Mehemet announced to the new sultan Abd-ul-Medjid his determination to assert by force his claim to the hereditary government of all the provinces under his command, as a reply to the sultan's recognition of the existence of a Caliphate independent of the powers of England, France, Austria, Prussia, and Russia, now induced the Porte to take no further steps without their advice. The negotiations which followed ended in the cession of France, and the conclusion of a treaty between the remaining four powers and Turkey, to complete the mission of Mehemet. The treaty was signed in London, on the 15th of July, 1840. In pursuance of this treaty a fleet consisting of English, Austrian, and Turkish vessels, commanded by Sir C. Napier, and consisting of Beyrout about the middle of September. Acre and Sidon shared the same fate shortly afterwards, and after much negotiation, Mehemet consented to give up Syria entirely, and received from the sultan the hereditary government of Egypt. (May 22, 1841.)

The religious situation is complicated and of the most intricate character. There are Mohammedans, who are of the Shiite sect, Jews, Christians of the Coptic and Greek, Latin, and Armenian churches [GREEK CHURCHES], and the Nestorians, who use the Syriac language. There are also many European residents, especially of the English and Lutheran churches, to watch over whose interests, and to advance Christianity among the Jews, a bishop of the Anglican church (Dr. Newcome) has recently been sent out, with the title of bishop of Jerusalem, by the combined efforts of the English and Prussian governments.

**SYRIAC LANGUAGE.** The Syrian, or Western Aramaic [ARAMAIC LANGUAGE], is the tongue of the Semitic family, and was spoken by the inhabitants of Syria and Mesopotamia, and, after the Captivity, in Galilee. It differs very little from the Chaldean, or Eastern Aramaic, the resemblance between the dialects being so close that Chaldean and Syrian are spoken by the same people. Both have the same vowels, with the exception of one inflection in the verbs. The two dialects differ chiefly in their systems of vowel points and in the use of a different character.

Under the old kingdom of Syria, was, in all public transactions, and to a great extent in common use, supplanted by the Greek, but even to this day it is sometimes heard in Syria. A mixture of the two dialects of the Aramaic formed the common language of Palestine in the time of Christ, and was written in the Syriac language, and is found in the New Testament many idioms and some words of the Syriac.

The principal, as it also the most antient work in the Syriac language, is the Peshito, or Old Syrian version of the Bible. [SYRIAC VERSION.] The principal Syriac grammars and lexicons are the following: Saftal, 'Opus Aramaicus', 1686; B. Michaelis, 'Syriacus', 1741; J. D. Michaelis, 'Grammatica Syriaca', 1764; Jastrow, 'Elemente der Aramaischen Sprache und ihrer Grammatik', 1827; Dr. F. Nolan, 'Introduction to the Syriac Language', 1821; by far the best grammar is Hoffmann's 'Grammatice Syriacae Libri iiii,' 1827: there are lexicons by Trotius, Gubryus, Saftal, and Zanolin. A SYRIAC VERSION of the Bible. Of the several versions that exist, two of which are of considerable importance. 1. The Peshito (literal) Version, also called 'The Old Syriac Version,' is one of the most antient and valuable translations of the Bible. The version of the Old Testament had been in circulation at least a considerable time before. Modern critics have referred its date variously to the first, second, and third centuries, the majority to the first. The opinion now generally adopted is that of Michaelis, who ascribes the translation of both Testaments to
The English name of this genus, lilac, in derived from lilag, the Persian for a flower. It is known by a small 4-toothed calyx; funnel-shaped corolla, with a 4-parted limb; 2 stamens; a trifid stigma; a 2-celled, 2-valved, 2-seeded capsule; the valves boat-shaped, with a dissepiment in the middle. The species natives of Europe and Asia, in colder parts of Asia; they are deciduous shrubs, with simple leaves, having purple or white flowers, which are arranged in beautiful thyroid terminal panicles, and are very fragrant.

*S. vulgarius,* the common lilac, known by its oval heart-shaped pointed leaves. It is a native of Persia, Hungary, and the borders of the Danube. Dr. Sibthorp found it wild on Mount Hymus, but not in Greece. This shrub has been long cultivated by the Turks, and was brought to Constantinople from China, by the Venetian Boubakes, in the middle of the sixteenth century, from whence it spread over the rest of Europe. It is now one of the commonest ornaments of our shrubberies, blossoming, together with other shrubs that resist the injurious influence of the smoke of cities, and flourishes in great perfection in most of the squares of London. It grows to the height of 20 feet and upwards, and sends up from the parent stem an abundance of suckers, if allowed to grow, and having broad, shining stems; these are commonly left, but if cut down as they are produced, the parent stem may be trained so as to grow as a small tree. It grows very fast, as much as from eighteen inches to three feet in the year, and endures, according to the nature of the soil, tho' not longer than three years. They are either alone or in combination with other shrubs, for the purpose of forming ornamental hedges for gardens, &c. The plants with which it is sometimes mixed in this way are the sweetbrier, the white and scarlet thorn, the Guelder-rose, and the Alchemilla vulgaris. &c. It forms the best and most beautiful of all ornamental shrubs, the best known of which are the common blue lilac (S. v. cocules), which is known by its blue flowers; the common purple lilac (S. v. violacea), frequently called the Scotch lilac, also known by the colour of its flowers; and that curious and rare lilac, S. v. mischtschei, which produced, this last flowers the earliest. There are also two varieties with red flowers, one of which is the *Lilas de Marly* of the French gardeners.

S. *Persica,* the Persian lilac, has elliptic-lanceolate, acute, cleft, wrinkled, glabrous leaves seated on short petioles, and white on the under surface, and purple flowers. It is a native of Transylvania, and was discovered by the Baroness von Josika, after whom it was named by Jacquin. It attains the height of six, if eight feet, and has broad, dense, shining stems and dark green above and hoary beneath. It grows in damp shady places near water. Though very dissimilar in appearance to the common lilac, it has been suspected to be only a variety of that species. It is not yet very common in our nurseries.

S. *Persica,* the Persian lilac: leaves small, lanceolate; flowers purple. It is a native of Persia, and is a small shrub, from four to six feet high. It is one of the most ornamental of low deciduous shrubs, and on that account is very commonly cultivated in gardens. They may be cut down, or may be made to flower at Christmas; but by this process the fragrance of the flowers is lost. Of this species also there are three varieties are found in the nurseries, the white, the cut-leaved, and the large-leaved Persian lilacs.

S. *Chinensis,* Chinese lilac: leaves twice-lanceolate; flowers purple. It is a native of China. In characters it is intermediate between *S. vulgaria* and *S. Persica,* and agrees with a hybrid plant produced at Rouen by M. Vain, and well known under the name of lilac (S. *Syrinica*). It grows vigorously, and attains a height of ten or twelve feet. The sorts known in nurseries as the Belgie *Lilas de Marly* and the *Lilas sauvage* are varieties of this species.

*S. *Esmodi,* the elliptical-oblong leaves, glaucous beneath, and nearly white above, in the second year; it blooms in the spring with purple flowers. It is a native of Kumanon near the Hima- laya. The *S. villosa* has villous leaves, and is found in China on mountains about Pekin, but neither of these species is cultivated in this country, although both would probably bear this climate.

All the lilacs will grow in almost any kind of common soil; the best way of propagating them is by the suckers which they send off in so great abundance. They may be grafted on privet or ash stocks, and in this way the propagation of their great produce of suckers may be greatly increased. (Loudon's *Arb. et Frut.* vol. ii.; Don's *Miller,* iv.)
SYRINGA

Syringa is also the name that is commonly but improperly given to the species of Philadelphia, or Mock-orange. The name Syringa was given to the lilac on account of its stems being used for the manufacture of Turkish pipes. The stems of the Philadelphia coronarius are also used for the same purpose, and equally with the lilac it had the name of Pipe-priuet, or Pipe-tree, given it when first introduced into this country, and afterwards the name Syringa. [PHILADELPHIUM]

SYRINGE (from ἁπλη, a pipe), a portable hydraulic instrument, usually made of metal and employed for the forcible ejection of fluids. In its simplest form it consists of a cylindrical tube, with a perforated nozzle at one end, and a piston or plunger, to the rod of which a ring or other convenient handle is attached. The tube being held in the left hand, the piston is pushed backward, and water drawn to the upper end of the tube by the right hand. The pressure of the atmosphere upon the surface of the water causes it to follow the piston, so that the syringe becomes filled with water. The instrument is then removed from the vessel of water, and, by pushing the piston back towards the nozzle, its contents may be ejected with a force proportionate to the power applied to the piston. Syringes of various sorts are extensively used for surgical, horticultural, and other purposes, a few of which may be briefly noticed.

The use of syringes for extinguishing fires is alluded to under FIRE-ENGINE, vol. x., p. 277. Syringes for this purpose appear to have been much used in London before large water-pipes and the pumping-engine had been introduced. [Engineer's and Mechanic's Encyclopaedia, vol. i., p. 505] mentions some of these, which are still, he says, preserved in the vestry-room of St. Dionis Backchurch in Fenchurch Street, and which are supposed to have been used at the great fire of 1666. These syringes are usually made of brass, and holding from two to four quarts each. 'Those of the former capacity were,' he says, 'about two feet and a half long, and one inch and a half in diameter, that the natural one, which has been furnished with handles on each side, and every syringe required three men to work it. One man on each side grasped the handle in one hand and the nozzle in the other, while a third man worked the piston or plunger, drawing it out while the nozzle was immersed in a supply of water, which filled the cylinder; the bearers then elevated the nozzle, when the other (man) pushed in the plunger, the skill of the bearers being employed in directing the stream of water upon the fire.' The large syringes used for horticultural purposes might also be added. The natural one, he adds, 'is fitted with a spike-like head, perforated at the end, for the discovery of a fire, when a very small quantity of water, promptly applied and accurately directed, might prevent serious mischief.

Garden-syringes are made either to throw water in a compact jet from a single simple nozzle with one perforation, or to distribute it in the form of a shower, from a rose perforated with a number of small holes. In the latter case especially, as time would be lost in filling the syringe if the water were conveyed through it, the nozzle side by side, while those for producing showers have the injection nozzle in the centre of the rose. In some cases the water is thrown from such syringes against a wall, that it may rebound so as to wash the back or under surface of the leaves, so that the leaves are moistened by the water without being touched upon them; and some syringes are made with curved nozzles, for use in a similar way. Their portability renders instruments of this kind particularly useful in conservatories.

Syringes may also be applied with advantage in washing cars, coaches, and for other purposes of outdoor sanitation.

In medicine and surgery syringes of various kinds are employed in administering dyes; in injecting fluids into, or removing them from, the stomach or bladder; in injecting the fluid of the glands, which is accomplished by the needle being inserted, and the melted wax being injected into veins, &c., in anatomical preparations. The application of the syringe as a stomach-pump is peculiarly important. In this case a flexible tube is put into the mouth of the patient, with a guard between the teeth to preserve it from injury, and a branch pipe is added to supply the syringe with liquid from a vessel, when it is used for injection, and to afford a channel for the escape of the abstracted liquid when the syringe is employed to empty the stomach. By an ingenious arrangement of valves, the same instrument may be so modified as to act equally well in either way. One method of using such an instrument is, first to inject a dilute into the stomach, and then to pump it back again, together with the injurious matter which it is desired to remove; and another plan sometimes found advantageous, is to inject a fluid into the stomach until an involuntary discharge takes place through the mouth, and to continue the operation until the stomach is cleansed. The syringe is then turned into a tube, with a stopper, and the instrument corked with a piece of bladder, are given in vol. xii. of the Society's 'Transactions.' A similar contrivance, in which the syringe is formed of glass, and other details are different from Mr. Harris's, although the same principle, that of producing a forcible ejection of a solid, liquid, or vacuous substance, has been lately brought much into use; and, still more recently, tubes of very thin metal have been adopted, from which the colour is expressed by collapsing the tube between the finger and thumb, without the use of a force of water, [Jamison's Dictionary of Mechanical Science; Hebert's Engineer's and Mechanic's Encyclopaedia; &c.]

SYRINGODEA (from ἁπλη, a pipe, on account of their long tubular corolla), a genus of plants belonging to the family of the Labiatae. Sir William Spencer, in his 'History of Plants,' says, that 'John Catesby, the excellent writer on American flora, has described Syringa, the old name of the genus Erica; while David Don out of the old genus Erica. It possesses the following characters: calyx 4-leafed, glabrous; corolla long, tubular, usually rather dilated at top, rarely a little contracted; limb short, 4-lobed; stamens for the most part united, filaments white, anthers assessed, borne in a capsule 4-celled, many-seeded; seeds oval, compressed, with a fleshy coat. (Don's Gen. PI., i., p. 426, vol. ii., p. 142.)' The genus Syringa is divided into several species, which have been named after persons, and are said to differ from each other in the number of their flowers; and twelve are described by George Don in Miller's Dictionary, are all natives of the Cape of Good Hope. They are erect shrubs, with loose leaves and large showy flowers, the tops of the branches being a very bright pink, and form a species of iris, in their cultivation they require the same treatment as heaths. [ERICA.]

SYRINGOPORA. [Madreporella.]

SYROPUS, or SGUROPUS, SILVESTER, a directory of the species of syrups and giroffines, the fruit of Florence, which was convened in 1436 A.D. by Pope Eugene IV., at Ferrara, and in 1439 removed to Florence. The principal business of the council was to settle the differences between the Greek and Latin churches. Syropus, who was present at the council, writes in a spirit of opposition to the attempted union of the churches, and his work must therefore he considered an ex parte statement.

This work was published, with a Latin translation and notes by Robert Creighton, an Englishman, at the Hague, and is dated 1560. His note to the passage, "Don Letus," by Leo Allatius [ALLATIUS], entitled 'Exercitiationes in Creightoni Apparatum, Versionem, et Notas, ad Historiam Concilii Florentini scriptam a Sguropulo," Rome, 1671, 4to.

(Schill, Geschichte der Griech.-Litt., iii. 323; Mosheim's Ecclesiastical History, cent. xx., pt. ii., c. ii., § 14, note.)

SYRPHIDÆ, a family of dipteron insects of the section Bruchystoma de Macquart, the species of which are allinsecta, and which thus, as the fore part of the head often with a prominence, the labrum large, arched, and emarginated; the style of the antennae is usually dorsal; the abdomen is most frequently depressed and elongated; the wings have one discoidal cell, three posterior cells, the first of which is closed, and the second extends along the posterior margin of the wing sometimes there are some small terminal nerves;
an anal canal is large, and a longitudinal nerver divides the discoidal sell, as well as the posterior.

The present family contains upwards of forty genera, a great portion of which have representatives in this country. The species most frequent here, and woods, the larva of the species of Syrphus is in the form of an elongated cone; they fix themselves, &c., with a kind of glue, and feed exclusively on aphides. Some of the Syrphidae inhabit the nectas of the humble-bees (Bombus), and these so much resemble Bombi, that they might at a first glance be mistaken for them. Other Syrphidae live in the larva state in water and mud; and these larvae are provided with a long slender tail, through the extremity of which they respire, it being raised to the surface of the water or mud for the purpose.

SYRAPHITES. [Tetragonidae.]

SYRTES (Συρτῆς) was the name given by the Greeks and Romans to the two gulfs on the northern coast of Africa, one of them called Syrte Major (4 μαγέα Συρτῆς), and the other Syrtes Minor (4 μικρά Συρτῆς). Both Syrtes were the terror of the ancient mariners. The name is said to be derived from the Greek verb συρήμα (draw or drug), from their drawing in ships and swallowing them up invisibly in their rays. Apollonius carved on the Arabian word sert (sands), which is at this day applied to the district on the shores of the Syrtes.

1. The Greater Syrtes, now called the Gulf of Sidra, is a very large bay on the northern coast of Tripoli, lying between the sea of Capchalese (Ras Kharras) on the west, and the island of Cephaloia (Ras Kapsotah) on the east, 100 geographical miles: its deepest depth is about 110 geographical miles. Strabo (p. 833-6) gives 900 (or, according to the correction of Ciancio), as the number of stadia for the greatest depth, 200 for the circumference, the diameter of its mouth, and about the same for its depth. The Sahara, or Great Desert, here comes down almost to the sea, leaving here and there only a narrow strip of land inhabitable. The gulf is very shallow and full of sand, and the coasts are adorned with islands of little islands. On this dangerous shore it was difficult to prevent ships from being driven by the north winds, in which the gulf is completely exposed, while the effect of such winds on the water made the soundings very uncertain. Under all these difficulties the ancient mariner in these parts was lest he should fall into the Syrtes. (Acts of the Apostles, xxv. 17.)

2. The less Syrtes, now called the Gulf of Khabis, on the southern coast of Tunisia, lies between the promontory of Kabea or Caput Vada (Ras Kapoea), that to the north, and the island Meninx (Jebab) on the south. Besides this island, those of Cercina and Cercinits (Karkenah) lie in its mouth, the width of which was generally reckoned 80 geographical stadia or 100 Roman miles. It is estimated at 600 stadia, or 60 geographical miles (Agathemurus, i. 5; Eratosthenes, ap. Strabo, p. 834), which is the real distance. (Eratosthenes (i. c.) gives 1600 stada for the circuit of the coast. The Roman writers, measuring from other points, give larger results than the above, namely 100 Roman miles for the width of the mouth, and 300 for the circuit. (Mel. i. 7; Plin., v. 4.) This gulf is said by Sylax (p. 48) to be even more dangerous than the Greater Syrtes. Its dangers arise however not so much from quicksand, as from the inundation and uncertainty of the tides on a flat shelving coast. (Rennell."

The Syrtes were known to the Greeks in very early times. Herodotus mentions only one of them by the name of Syrtes (ii. 22, 150; iv. 169). It is generally thought that in their time, this region under the name of "Homestylus" is given to the Greater Syrtes, and that his Lake Tritonis is the Lesser. He states (iv. 176-9) that Jason, when on a voyage to Delphi prior to the Argonautic expedition, was driven by a north wind from Malia into the bay of Lake Tritonis, but he overlooks the dangers of the gulf which he calls Syrtes. His allusions are very difficult to explain. Müller supposes that the story about Jason refers to the Greater Syrtes (Ochomeneus, p. 354); and Niebuhr contends that wherever Herodotus speaks of the Syrtes he means the Lesser. (Vermischte Schriften, p. 147.)

The march by land round the Greater Syrtes was difficult and dangerous. Edrisi describes a portion of the road as passing over ground in a state of solution; in fact, sand saturated by the sea-water. Strabo (p. 836) states that Cato, in marching from Berenice, through the Syrtes, was compelled to pass through deep and burning sand. In connection with this march, Lucan gives a spirited description of the Syrtes (ix. 390, &c.)

The Lesser Syrtes is remarkable for the great variations in its tides, in consequence of the east winds, to which it is exposed. The lake bordering upon it, which is now called Lake Bassa, was by the ancients called Syrte, and is connected with the Syrtes by a channel; and this lake must be included under the Lake Tritonis of Herodotus, if we suppose the latter to be the Lesser Syrtes.

"Herodotus's Geography to Herodotus, i., sec. xxiii., p. 314 &c.; Herodotus's Geography and Arrian's, Carter, i., p. 33; Mannert, Geographie der Griechen und Romanen, x. 2, pp. 106, 157; Georgii, All Geographie, p. 504; Shaw's Travels, p. 194.)

SYRUPS are medicinal solutions of sugar, either in water alone, as in simple syrup, or in liquids containing with some peculiar principle of an active kind, such as avena or buckthorn, or merely grateful from its colour or fragrance, or both, such as syrup of violets. These must be of a proper consistence, either by having a suitable quantity of sugar, or by the addition of a part of the superfluous water. The former is the preferable mode, as the syrup keeps better. The purest and most thoroughly refined sugar should be employed, and generally in the proportion of two parts of sugar to one of fluid. When employed thus the mixture receives a technical name: the more water is added the mixture is called syrup. When too little sugar is used, fermentation is still more apt to occur: when too much, the excess crystallizes. Syrups are more used for their fragrance or colour than for their medicinal properties, which few possess to any important extent. Their name is derived from the Arabic word sart (sands), which is at this day applied to the district on the shores of the Syrtes.

SYRUS, PUBLIUS. [Publius Syrus.]

SYSRAN. [Simbar.] SYSTEM (Mathematics). a word little used: we hear sometimes of a system of equations, or of a system of curves or surfaces; the former meaning a set of equations which are related to each other in the same problem, the latter a class of curves or surfaces which are connected by any law.

SYSTEM (Astronomy). This term is applied to every theory of the disposition and internal arrangement of the planets, and the system of the moon, or any other heavenly body, as well as to the system of the system. We have the system of Ptolemy, of Copernicus, &c. Perhaps a short description of the distinctive characters of the different systems may be useful in a work of reference.

The planets revolve in circles about centres which themselves revolve round the earth. (Ptolemaic System.)

Copernic.—The sun is a centre, round which the planets revolve. Some of the machinery of the Ptolemaic system is retained.

Tychonic.—The sun is a centre of motion to all the planets, which revolve round it, while the sun and planetary orbits are carried together round the earth as a fixed centre.

Semi-Tychonic.—The sun is a centre of motion to Mercury and Venus, as in the Tychonic; all the rest of the other planets are in the Ptolemaic system.

Newtonian.—There is no fixed centre, the sun only approaching to that character from its greater magnitude. The orbits of the planets are approximately represented by ellipses, exactly by ellipses of the same plane.

The Newtonian system is frequently called Copernican, from its rejecting what Copernicus rejected; but it is far from receiving all that Copernicus received. The introduction of the idea that it was intended to alleviate. When too little sugar is used, fermentation is still more apt to occur: when too much, the excess crystallizes. Syrups are more used for their fragrance or colour than for their medicinal properties, which few possess to any important extent. Their name is derived from the Arabic word sart (sands), which is at this day applied to the district on the shores of the Syrtes.

The term system is also applied to the subdivisions of the solar system: thus we have the terrestrial, Jovial, Saturian, Uranian systems.
SYSTEM, PTOLEMAIC. This article would have come under Synaxis, but for circumstances which occasioned delay.

In the article Ptolemaic System we have explained the principal points of that system as exhibited by the followers of Ptolemy, and in the form in which it was attacked by the followers of Copernicus and Galileo. Our present article has reference to Ptolemy personally, and to his astronomical writings. We shall begin by a short account (from Delambre) of his mathematicai Synaxis, or mathematical synthesis, which is a translation of the first and second books of the Almagest.

The word Synaxis means, literally, parts of a whole; and, as such, it is applied to great Synaxis, or great Synaxis, shortened and heightened by the Arabs into Almagest.

Book I. Ptolemy gives notice that he intended to state briefly what Hipparchus or any other astronomer before him, and to enlarge upon what has not. He gives his proofs, physical and metaphysical, that the earth is spherical and fixed, and that the primary motion of the stars is circular; as also that the earth is the centre of the universe.

One sphere produces the diurnal motion, another that of the precession: his expressions in this chapter do not settle the point whether he believed in the solid spheres, or only considered them as an hypothesis. He describes the theory and construction of his table of chords, and two instruments for using it, the one for the equator, and the other for the ecliptic. It is doubtful from his expressions whether he had ever used the first, which is the better of the two, and whether the second could be made available. He gives no other distances of the sun from the earth, of the tropics, or of the equator, with respect to the ecliptic.

The latitudes are found from the gnomon; but in the examples Rhodes (where Hipparchus observed), and not Alexandria, is chosen: Delambre suspects that these are taken from Hipparchus, and that negligently. He fixes the times when the sun will be in the zenith of a given place, gives the method of determining the longest day, describes the various climates above mentioned up to the pole, converts the ordinary mode of reckoning time (namely, twelve hours to the day and twelve hours to the night, differing at different times of the year) into sidereal time, and enters into details, and gives tables, on the position of the ecliptic in various latitudes with respect to the horizon. He speaks of the table of longitudes and latitudes generally, but the latitude comes to nothing particular.

Book II. Dividing the earth into four parts by the equator and one meridian, Ptolemy begins by assuming that one only of those parts is habitable. This part he divides into particular districts and provinces.

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Book III. Ptolemy gives the reasons for the tropical year being preferable to the sidereal. He contends for the tropical years being all of the same length, in opposition to Flamsteed's and Delambre's views. He attacks the views of the librations of the equinox, and in particular the apparent apsidal motion of the moon, as observed by Flamsteed. Ptolemy proceeds to give his values of the daily motion of the moon, both with respect to the stars, her perigee, and her node. In the first he agrees with Hipparchus, and in the second and third makes such trivial alterations in the results of the latter, that it is difficult to see how he could have thought they observed good for such small quantities. After mentioning that all his predecessors, without exception, had seen only one inequality in the lunar motion, he makes mention of a second inequality. He then proceeds to the motion of the moon, and concludes that there are three phases presenting the same phases. In the whole of this chapter he is apparently following Hipparchus.

Book V. This book contains the account of the discovery of the ejection, [Moon], of which even Delambre admits that this one discovery would place Ptolemy in the first rank of astronomers; but without observing that it appears from Ptolemy himself that Hipparchus had felt the want of a second inequality, but had not time or opportunity to work it out. This complicated inequality depends upon the position of the sun with respect to the moon; and it was ascertained by comparison of eclipses, and represented by placing the epicycle of the former inequality upon a revolving excentric. He then proceeds to the subject of the moon's distance from the sun, and observes how Hipparchus had doubted whether the parallax of the former was appreciable, but had not ventured to suppose it less than 3'. Ptolemy brings nearly the same result, and so makes the sun's distance about the twentieth part of its real amount: in that of the moon, he gives Hipparthus incorrect quantities.

Book VI. This book is devoted to eclipses, the determination of the limits within which they are possible, and their prediction in the case of lunar eclipses. He appears not to have had much reference on his own theory for a solar eclipse.

Book VII. Ptolemy notices the most probable positions of the fixed stars, comparing them with those given by Hipparchus, to prove that the procession affects them all equally. So very numerous are his observations, considering the paucity of those which he gives as Hipparthus in important and doubtful subjects, that some have doubted whether he ever really did observe anything with instruments in the matter of the fixed stars. Hipparthus made the procession to be one degree in a hundred years, instead of seventy years; and Ptolemy takes care to verify his result by a most suspiciously close accordance of observations. The celebrated catalogue which this book contains was observed by Ptolemy himself, as he says, though it has been suspected that he had deduced his own from Hipparthus's value of the procession to the longitude of his Geographical Chart. No star is contained in it which could not be seen at Rhodes, though there are several which an Alexandrian observer might have added. Longitudes and latitudes, not right ascensions, are observed; but the equinoxes are often states that they were directly observed. The number of stars is 1022, rather less than that in the catalogue of Hipparthus. Delambre's comparison of the distances of stars from each other, as compared with those deduced from Ptolemy, is elaborate.

Book VIII. The Milky Way is described. The construction of artificial globes is pointed out in a manner exactly resembling that in use at present. Long details follow on the rising and setting of the stars as seen from the sun.

Books IX., X., XI. These books treat of the diurnal motion of the planets: the first generally, and of Mercury in particular; the second of Venus and Mars; the third of Jupiter and Saturn. Hipparthus, Ptolemy says, hardly commenced this subject. He places the deferent axes between the earth and sun, in opposition to the opinion held by some. He recognises two distinct motions: the first that which Hipparthus applies to the list of planets, and that of Mercury in particular; the second of Venus and Mars, of Jupiter and Saturn. Ptolemy observes a difficult question, whether the motion of the moon proceeds by a direct, or an involuting motion, on which the planet moves in an epicycle. In the case of Mercury and Venus, the epicycle answers to the orbit of the planet; in Mars, Jupiter, and Saturn, to the orbit of the sun. Then the first centre of the epicycle is that of the sun; in the second, the motion in the epicycle. This obvious dependence of the motions of all the planets upon that of the sun leads to the
remark upon the possibility of the sun itself being the centre of their epicycles. The complication of these hypotheses, which afterwards became so striking, begins in an attempt to represent the motion of Mercury by an additional circle.

Book XII. contains the deduction of the phenomena of stationary and retrograde motion in the planets from the theory already laid down.

Book XIII. contains the modifications of the positions of the epicycles which were needed to account for the planets' motions in longitude; and also an account of the distances from the sun at which they begin to appear.

The first account of the Optics of Ptolemy was given by Delambre (Hist. Astr. Anc., vol. ii.), from a Latin manuscript in the Royal Library at Paris. Montucla and others were only able to speak of it from the presumption that Alhazen had copied it; among other mistakes which this gave rise to was the attributing to Ptolemy a good explanation of the apparent enlargement of the sun and moon near the horizon. It contains, among many errors and some good experiments on the passage of rays from one medium into another, a distinct statement of the fact of atmospheric refraction, of its tendency to raise the stars towards the horizon, and of its connexion with the apparent distance of the star: the phenomenon being attributed to its true cause, the alteration of density in the media which the light traverses. That Ptolemy wrote on Optics is certain, and Delambre seems to take it for granted that this translation was done in the Royal Library at Paris. The only hypothesis which Ptolemy's work from the Arabic. There are other copies mentioned in library catalogues, and a proper comparison and critical discussion of the claims of the work will no doubt one day arrive.

The work on the Planisphere, attributed to Ptolemy, has also come down through the Arabic. It is on the stereographic projection, which was known to Hipparchus; and Ptolemy mentions the work of Hipparchus as being modelled on that of Hipparchus. The other hypothesis (an instrument intended to facilitate the construction of sun-diagrams) is also only known by translation from the Arabic. The Περίαθλησθας, a work on astronomy, has come down in Greek, with the paraphrase of Proclus. All these works are fully described by Delambre, with whom the labour of love (towards Hipparchus) to sift the writings of Ptolemy.

The fate of the Ptolemaic system, since the Galilean reform, is a close parallel with that of the Roman church in England. The advantage of the modern establishment, remembering only the opposition with which their opinions were met by those once in power, and forgetting the services which the older establishment had rendered through a long succession of ages, has enabled us to exhaust the powers of language in undiscriminating depreciation; and Ptolemy, who was the astronomer's best guide (and no bad one either, all things considered) for centuries, and the monasteries which preserved all literature through the Middle Ages, have only known the name of as the stroved of Copernicus, or the denounced of Luther. In time, a tardy justice is done, and never was there an instance in which it was more required than that of the Syntaxis.

If we look at the immense mass of labour which Ptolemy left behind him, to say nothing of the works which have been lost, and consider that not one fragment of it exists which did not actively exercise minds of all degrees of power from the first translations of the Arabs to the middle of the sixteenth century, we may have a slight idea of the effect of his writings. Only Aristotle, of all the ancients, can be compared with Ptolemy in the commanding character of his influence.

As to his astronomical observations, we see no reason to doubt that Ptolemy, who was, we think, almost to demonstration, that Ptolemy was perhaps not an observer at all, and that at most his observations must have been of the rudest kind, compared with those of Hipparchus. It was Ptolemy himself that we learn this; for there is no one to converse with him in stating more plainly when he follows Hipparchus, in conducting his imitations or adaptations of the latter with a degree of openness which invites attention to the source from whence he drew, and, above all, in showing how he applies his deductions without regard to the subject of his predecessor's merits, he earns, or ought to earn, confidence when he expressly attributes anything to himself. The epithet which he bestowed on Hipparchus, the lover of toil and truth (φαντωμος και φαντωμος), may well be added to his own name.

It is as an astronomical theorist that Ptolemy has earned the fame which outlasts his system. His much abused epicycles were no other than geometrical representations of the process which a modern analyst would have been obliged to follow under the same circumstances. If a periodical magnitude is to be represented, a series of sines or cosines is chosen, the angles of which depend upon the inequalities and the coefficients upon their extreme magnitudes: this is precisely the algebraical representation of the process of Ptolemy. A question has arisen as to whether he himself believed in the solid crystalline orbs which his followers placed in the heavens. We have no direct evidence of that, and only that he learned to such a belief, but a much larger number are expressive only of an hypothesis which serves appearances, to translate literally, or represents phenomena. Had he really adopted such a material mechanism, he, who could argue that celestial motions must be circular, because circular motions are the most perfect, would not have been without some a priori reason for the solidity of his planet-carríges. If he had had a better physical system, the state of mathematics of Ptolemy's works might still; and the small number himself had no more satisfactory mode of explaining the inequalities of the planetary motions than these same epicycles; nor, as we have said, could a modern astronomer, with new phenomena to represent, and no physical cause to refer these to, adopt them in translation, in trigonometrical language, instead of geometrical.

The methods of Ptolemy are those of a great mathematician; and the explanation of the equation of time, of the erection of the moon, and of the planetary orbits, are, the two first absolute truths, which the third as expressed in the two preceding, masterpieces of success, the last of which has only lost its glory because the pertinacity of his distant followers led them to put a mathematical explanation in the place of physical one. Delambre, who hints hard, and we think unfairly, at a division of the merit of the two former with Hipparchus, sees in the method proposed by Ptolemy for the representation of what we now call the eccentricity of Mercury's orbit, the circumspection which suggested the phrase to Kepler.

The Syntaxis and other works of Ptolemy fell into the hands of the Arabs, and gradually went out of sight in Europe, as did most other Greek writings: the first was translated into Arabic, Persian, and Hebrew. The bibliographical history of Ptolemy's works might also be compared with anything else of our Syst. 1549, 1558, 1560, and 1566, all in 8vo. First Latin translation by George of Trebizond (Trapezuntius), said to have been made from the Greek: reprinted in 1527 (?), and 1528 by Gaufricicus, and in 1551 (Basle).

1536, Basle, 4to. The Planisphere (in a collection).
1536, Venice, 4to, the same, with Commandino's Commentary.
1538, Basle, fol. The first Greek edition, with Theon's Commentary and that of Pappus on the fifth book: by Grynaeus, from a Nürnberg manuscript obtained by Cardinal Bibl. 1表. 1541, Basle, folio. Third Latin translation (all the works except the Geography). This is Trapezuntius, edited by Schrenckenfuehsius.
1549, Wittenberg, 8vo. The first book of the Syntaxis (Greek), by Reinhold: again in 1560, Paris, 8vo.
1562, Venice and Rome, 4to. The Almagest, with Commandino's Commentary, by the same, 1573, Rome.
1569, 8vo. Canones Astr. Math. (Gr., Lat.), by Reinhold.
The planet brown Montignot's calyptra.

[ etc.]

In modern music the term System is applied to any theory of composition in which the voices are highly organized, and the manner of treating them in composition. Thus we have the systems of Rameau, Tartini, Kirnberger, &c., which see under the names of their respective authors. The System of Guido d'Arezzo, or that ascribed to him, included the elements of our present mode of notation; also the division of the scales into hexachords, and a mode of solmisation founded on such division. [GUIDO; HEXA-

CHORDS.]

The Syzygies and Quadratures. The syzygies of a planet or of the moon are those points of its orbit at which it is in conjunction or opposition with the sun: the quadratures are the precisely intermediate positions. Thus at new and full moon the moon is in syzygy; at half month, in quadrature.

SYZYGIUM, a large tropical genus of plants of the natural family of Myrtaceae, so named from syzygos (eidos), coupled, in consequence of the manner in which the branches and leaves are united together in pairs. The only species is obtusa, with the leaves entire. Petals 4-5, forming a calyxper. Stamens numerous, free. Style single. Stigma simple. Ovary 2-celled, ovules several in each cell. Berry one-celled, one or few seeded. Trees or shrubs of a highly ornamental appearance from their smooth shining bark, the barks of gold. Trees and shrubs of the surrounding mountains are among the richest in Hungary.

Szathmar, the largest town, though not a city, is the capital of the county, and has above 11,000 inhabitants, who raise excellent corn, maize, and tobacco. They also manufacture linen and cotton, and make large quantities of boots and shoes for exportation. The town is of considerable extent. It has a handsome square, a county-house, a town-house, and several churches and chapels; a college of the Jesuits, a gymnasium, and a primary school. There is here also a very fine palace of Count Károlyi, with extensive gardens, an excellent stud, and a Swiss farm, where a great number of buffaloes are bred. In the neighbourhood there is a park in which there are wild boars and hogs, and a preserve for game.

Pelce Banja, a mining town with 4700 inhabitants, who are chiefly employed in the rich gold, silver, lead, copper, zinc, and iron mines. They also manufacture a good deal of earthenware.

(Thiele, Das Königreich Ungarn; Blumenbach, Die österreichische Monarchie; Ungarn, Schloß- und Landee, Nommen.)

SZEGEDIN, the capital of the Hungarian county of Csongrad, is situated on an eminence on the right bank of the Theiss, at its junction with the Maros. The external form of the city is a square, surrounded with circular fortifications. It is divided into the city, called Palek, which has well-built houses, neat but unpaved streets; the suburb which is a plain very fruitful, producing abundance of wheat, maize, flax, hemp, tobacco, and fruit. The sides of the mountains, to a great extent, are covered with vineyards, which yield excellent wine. In the mountainous parts, especially about Nagy (i.e. Great) Baranya, of which oxen, sheep, and great quantities of bees: honey and wax are important articles of commerce. In the large forests there is abundance of game, and some beasts of prey, wolves, foxes, and bears. The country is rich in mineral waters; there are large blocks of water-fowl; and in the rivers, especially the Szamos, many kinds of fish. The country is very rich in minerals, viz. gold, silver, lead, copper, zinc, antimony, arsenic, amethysts, chalcedony, jasper, porphyry, granite, sandstone, basalt, siltstone, brimstone, etc.

Of the two royal free towns in this county, the largest is Szathmár-Nadwestry, which was formed in 1792 by the union of two towns, Szathmar and Nemeth, which are separated by the river Szamos. The part called Szathmar is in an island in the river, and is surrounded with a wall. The principal public buildings are the cathedral, and one Roman Catholic, two Greek, and two Protestant churches; and the handsome town-house of the bishop, which was formerly a Jesuits' convent, and the seminary. This town is the see of a bishop, with six canons, founded in 894, by the emperor Franci. The bishop has under him a theolog-
T.

T is the thin (tenus) letter of the dental or palato-dental series. For the various forms of the symbol by which it is represented, see ALPHABET. The chief changes to which the letter is amenable are as follows:

T is interchangeable with c, as Lat. nuc (nux), Eng. nut. [See C (§ 6).] The resemblance of these letters in Latin manuscripts is so close that it is often difficult to distinguish them. There is much uncertainty in the orthography of many words in that language. Yet there is no doubt that contio, an abbreviation of convento (in the sense of contro), actually occurs in the so-called bacchanalian inscription, and nautius or nanous, an abbreviation of norm-un-tius (compare norm-tius), should be preferred to the forms concio, nuncius, which are commonly found in English Latin authors.

T is interchangeable with d. [See D.]

T is interchangeable with th, whether as pronounced in thin or in the. Thus the Latin t corresponds to the most part to th in English, as tu, tres, tenuis, tundu, tumult, turbocoe, pater, mater, of the former language, severally correspond to thou, three, thin, thump, then, thousand, father, mother, of the latter. As regards the pairs words, torqueo, thron, it is worth observing that they both have a double meaning, hurt and twist. Even the termination of the third person in the Latin and old English verbs presents the same analogy, as amat, loveth.

T is interchangeable with s. [See S.]

T is interchangeable with st. This interchange might be inferred from the one preceding. Examples exist in art, will, shall, compared with the usual termination of the English second person.

T is interchangeable with l. Thus the Latin words lingua (also lingua), lacr-uma (also lacruma), lacerare, ligare (also dicere), severally appear in English as tongue, tear, (subst.), tear, (verb.). Hence the English is allied to the Latin alius and multitatis of the Latin to mild in English. Compare also the Latin ali-quod, with the German etwa, etc. [See L.]

T is interchangeable with nd. This change is perhaps not common. Examples are, Lat. et, germ. und, Eng. and; Lat. sed or set, Germ. sond-ern, Eng. sund-er, sundry, etc.; Greek agno, German ander, Lat. fund-us, Eng. bottom.

T disappears from the beginning of words before l, as in latus, the so-called participle of fero, but in fact connected with the Latin tollo, and the Greek λαλον, ρολον, ρολοι. An older form of latus was perhaps litus or stutus.

T in the middle of words, when flanked by vowels, often disappears. Thus the Latin words pater, satis, vita, amas, amata, reappear in French as pere, sez (in the compound az-sez, from ad-satis), vie, aime, aimez. Similarly, from the map of Gallia, viewed in connection with the map of France, may be derived the samples,—Auver, Eure; Catusrige, Chorges; Catalaun, Chalons (sur Marne).

T at the end of words is frequently dropped. Of the omission of a final t in pronunciation, the French language has numerous examples, as in et, cat, et, etc. It is very probable that a final t has in this way disappeared from the third person singular of many tenses in the French verb, as il aime, il aimera, qu'il finisse, etc. In the interrogative form aimle-t-il, the interpolated t really belongs to the verb, and owes its preservation in this form to the fact that a vowel follows. It is an error to attribute the insertion of the letter to the necessity of avoiding an hiatus. Even the Greek language drops this t in the suffix of the third person, as in τετευχ, τετευχτ, for τετευχτετευχτετευχτ. Compare the middle forms τετευχτετευχτετευχτ.

T before a vowel is often changed to a sibilant represented by s, sh, ch, etc. Thus from the Latin facio, facere, the French foison and the English fashion. So auraria, malitia, viation, became in French and English avarice, malice, vice.

TAAISING. [DENMARK; FÜNNEN.]

TAB. [PERSEAN GULF.]

TABARCA, TAB'BRACA, or THA'BRACA, a small island close by the north coast of Africa. It is situated opposite the north-eastern corner of Numidia, at the mouth of the little river Tunca, on the left bank of which there was an antient town of the same name as the island, which Pliny (Hist. Nat., v. 2; compare Ptolemaeus, iv. 3; Pomp. Mela, i. 7, 5) calls an 'oppidum civium Romanorum.' Of this island many who still live down to the bank of the river, which is now called Zaine. (Shaw's Travels, p. 99.)

The little island of Tabarca has in modern times been in the possession of the Genoese, who once derived considerable advantage from the coral fisheries there, and built a fort upon it to protect their settlements and guard the profits of the coral fishery decreased, the Genoese left the island to the day of Tunis. (Shaw's Travels, p. 142.)

The island is at present in the possession of the French, to whom it was given up in 1830 by the day of Tunis. The harbour is now again much frequented by fishermen, on account of the rich coral fisheries in the neighbourhood.

TABARI' is the surname of Abú Ja'far Mohammed ibn Ya'zid Ibn Jerir. A celebrated Arabian historian, who was called At-tabari because he was a native of Amol, the capital of Tabaristan, where he was born in a.h. 224 (A.D. 839). Tabari was the author of many works on various subjects, such as a commentary on the Korâk, which is greatly esteemed by Abu-l-feda, and a treatise on Mohammedan law. But the work by which he is best known in Europe is his general history from the creation to a.h. 302 (A.D. 914-5). This work was abridged and continued by George, son of Al-amid, generally called Abu-abdallah, who died in the year 512 of the Hijra (A.D. 1118-9). That portion of the abridgment which begins at the death of the Mohammedan prophet was published in Arabic and Latin by Thomas Eprenius, with a Latin translation by Bishop Elmacin, and published together with the 'Historia Arabum,' by Rodericus Tabarici. Tabari's Chronicles were translated into Persian by Abú Abd Allah-gni, Vizir of the Samanide prince Manzur ibn Nûh. Soon after the death of Tabari, the copies of his original work became scarce, and the Persian text was retranslated into Arabic; the Persian version is now being translated into French by Mr. Dubœuf under the auspices and at the expense of the Oriental Translation Fund. Tabari died at Baghdad, in a.h. 310 (A.D. 923).

Hamster, Spec. MSS, Bib. Or. 1145, p. 24; D'Herbelot, Bib. Or., sub voc. 'Tabari.'

TABARIEH. [PALESTINE, p. 163; SYRIA, p. 472.]

TABASCO. [MEXICAN STATES.]

TABERG. [SWEDEN.]

TABERNACLE, THE (ταβινδλια).—And sometimes, chiefly in Numbers, ταβινδλια, or ὄς ὄς, or σφνμa των μαρτυρων; that is, the tabernacle of the testimony, was a sacred building, partaking of the nature of a tent, which was set up by the Israelites in the wilderness for the worship of God, and carried with them in their journeys. Hence it is called by Jewish writers 'a portable temple.' (Iqra' ḥagd, Philo, Opp., ii., p. 146, μανδαρων και σφνμωτα.) Joseph., Antiq., iii. 6, 1.)

It was made under the direction of Moses, in exact conformity to a pattern shown to him by God when on Mount Sinai. (Exod., xxv. 40; xxx. 30, &c.; Deut., viii. 5.)

The tabernacle was an oblong rectangle, 30 cubits in length, 10 in width, and 10 in height. Its two longer sides looked north and south, the entrance being at the east end. The sides and the west end were composed of curtains of striped acacia wood, covered with gold. These boards stood upright, and were supported by tenons projecting from their lower ends, which dropped into sockets of silver, each board having two sockets. Each board was 10 cubits long, and 1½ wide; and there were 20 boards to form the length, and 2 to form the end. Here arises a difficulty. The 8 boards at the end make up 12 cubits, instead of 10. Now it is clear from Exod., xxvi. 22-24, that the two boards at the corners were of a different form
None but the priests were allowed to go into the tabernacle. They entered it twice a day; in the morning to put out the lights, and in the evening to light them; and also on the Sabbath to place the new shew-bread. The Holy of Holies was entered by the high-priest alone, and by him only once a year, on the great day of atonement. Of course there was a necessary exception to this rule when the tabernacle had to be taken down or set up. The care of this service and of carrying the sacred things on the march was committed to the families of the Gershonites, the Merarites, and the Kohathites, of the tribe of Levi.

The tabernacle was first set up by Moses on the first day of the first month of the second year from the Exodus, when the presence of God was manifested by the shewbread, which filled the tabernacle as long as it remained at rest, the shewbread was over the tabernacle, as a cloud by day and a fire by night. The lifting up of the shewbread was the divine signal for the people to march; and when it gained a fixed point, there the tabernacle was set up. After the conquest of Palestine, the tabernacle was set up in Shiloh, where it remained, with the ark of the covenant in it, till the latter was carried out to battle and taken by the Philistines. Later, the Philistines moved the ark to chambers, which were respectively 20 feet by 10, and 10 feet by 10, of which the outer and larger was called the Holy Place (אשׁר), the inner the Most Holy, or the Holy of Holies (;&lt;em&gt;&lt;strong&gt;תֹּבִֽתֵּשׁ דַּדַּשׁ &lt;/strong&gt;&lt;/em&gt;Dan.), (LXX., τὸ ἱερό ἱερόν ἱερόν; Joseph., τὸ ἅρπαγκον). The structure thus formed (which was still open at the top) was covered by four different kinds of curtains. The first curtain was of the same material as the two vails, and consisted of 10 curtains, each 28 cubits long and 4 wide, which were first joined together five and five, thus forming two curtains, each 28 cubits by 20, and then these two curtains were joined by a golden fastening. The second curtain was also of 10 curtains, each 28 cubits by 15, with golden fastenings, and placed over the tabernacle, but the fastening lay over the inner vail; the outer curtain reached exactly to the entrance, without falling over it, thus covering the Holy Place, and the other covered the Holy of Holies with half its length (10 feet), leaving 10 feet to hang over the back of the tabernacle, while the remainder of the curtains fell over the sides (according to the opinion of some, within them), leaving one curtain at the lower end of the boards uncovered, since the heights of both curtains and the length of the vails, the curtains, the vails, and the boards, being computed 28 cubits, but the width of the curtains was only 28. The next covering was of fine spun goats' hair, and resembling the former in every respect except that it was somewhat larger. Over these coverings, to protect them from the weather, came the tabernacle, being of sheep-skin dyed red, and the outer of skins of tachinah (תַּחַנָּה), a word which is variously explained as meaning the badger, the seal, or the blue colour. The tabernacle was surrounded by a large court, called the court of the tabernacle, which formed a rectangle of 100 cubits by 50, and was enclosed by fine linen hangings, suspended on 60 pillars of 5 cubits in height, with silver capitals and hooks and base sockets. The four pillars in the middle of the eastern side supported a curtain like the vails of the tabernacle, which formed the gate of the court. Around this court were the tents of the Levites according to their tribes, in a semicircle the encampments of the other tribes, three tribes on each side of the tabernacle. Each of the sacred vessels and instruments had its appointed place in the tabernacle. Near the entrance of the outer court and the brazen laver, burnt offerings, on which were presented all the burnt offerings and sin offerings which were not required to be offered without the camp. Further on was the brazen laver, where the priests were required to wash their hands and feet before they entered the tabernacle. Within the Holy Place was the golden table of shewbread on the north side, and the golden candlestick on the south side, and the golden altar of incense, with their implements. In the Most Holy Place was the ark of the covenant, with its cover, the mercy-seat, the symbol of Jehovah's throne.

We have not such exact information respecting the history of the tabernacle during this period. By comparing 1 Sam., xxii., with Mark, ii. 26, we learn that it was at Nob in the time of Saul. At the beginning of Solomon's reign it was at Gibeon (1 Kings, iii.), whence it was taken by Solomon, and placed in the temple, at the time when he removed the ark. (2 Chron., v.) The institution of the tabernacle was in perfect accordance with the spirit of the Israelitish constitution. God was the king of Israel; he had promised to be with them, and to go with them in their journeys, and the tabernacle was his abode. Here the glory which was the symbol of his presence was displayed, and hither the people came to worship him and to inquire his will, while his chosen servants the priests and Levites were engaged in the service of God, as typical of the blessings of the Gospel. (1 Heb., ix.)

(Winer's Biblisches Realwörterbuch, art. 'Stiftshütte'; Calmet's Dictionary, s. v.; John's Biblical Antiquities: The Tabernacle in the Wilderness, 1 vol., fol., with four splendidly illuminated plates, Bagster, 1842.)

TABERNACLES, FEAST OF (יִּקְרָע, יִּקְרָעָה), was the last of the three great annual festivals of the Israelites, which required the presence of all the people in Jerusalem (Exod., xxiii. 16; Levit., xxiii. 34; Numb., xxix. 12; Deut., xvi. 13). Its object was to commemorate the dwelling of the people in tents during the wilderness; and it was also a festival of thanksgiving for the harvest and vintage, whence it is called 'the feast of ingathering.' It was celebrated in the autumn, at the conclusion of the vintage, and lasted eight days, namely, from the 15th to the 23rd of the seventh month (the month which corresponds to October). The first and last days were holy convocations, in which no work might be done, and the last was the greatest day of all the feast (John, vii. 27). In the opinion of many biblical antiquarians, the feast of tabernacles properly lasted only for seven days; all the peculiarly 'the feast of ingathering.' (Nehem., viii. 18.) This feast lasted longer than any of the other great feasts: it was kept with greater demonstrations of joy, and more sacrifice were offered during its continuance. (Levit., xxiii. 12-38.)

During the feast the people dwelt in booths, which were
made on the tops of their houses (Nehem., viii. 16). These booths were made of the leafy branches of certain trees, which are mentioned in Levit., xxiii. 40, and Nehem., viii. 16, and among which seem to be included the citron, the palm, the olive, the myrtle, and the willow. These booths were meant to represent the tents in which the Israelites dwelt in the wilderness. In the sabbatical year, the law was read in the presence of all the people at this feast. (Levit., xxiii. 40, Nehem., viii. 16.)

Like many other of the institutions of the Mosaic law, the feast of tabernacles was neglected during the period from the settlement of Israel in Palestine to the Captivity. It was revived in the time of Ezra and Nehemiah. (Nehem., viii. 16.)

Plutarch (Sympos., iv. 6) gives an account of the feast of tabernacles, which he supposed to be in honour of Bacchus.

The later Jews have added other ceremonies to those which are assigned to this feast in the law. They carry a citron in the left hand, and a bundle of branches, namely, one of the palm-tree and two of the willow and myrtle, in the right, with which they walk in procession round the booths. (Hippocrates, De nupt. tabern., lib. iv., 6.) This was done antecently before the altar at Jerusalem, with water brought from Siloam. 3. They assert that lights were burnt in the court of the women on the first evening of the feast. These lights were in large golden candlesticks, and their presence is a fitting visit to the holy place. (Winet's Bibelisches Realwörterbuch, art. 'Lambönten fest'; Jahn's Biblical Antiquities; Jennings's 'Jewish Antiquities.')

TABERNEMONATA, a genus of the natural family Apiaceae, found in the West Indies and South America, also in New Holland, India, and other tropical parts of Asia. It was named by Pluemer in honour of James Theodore, who was summoned Taberemontanus, from Belgium, where he was born. He was the author of two works, his 'Krauterbuch,' and 'Figures of Plants.' The first, published in 1589, and the second in 1590. He was also physician to the elector-palatine, and died in 1590. The genus is characterised by having monopetalous inferior flowers in the synangia, singling Sta- men 5, included. Anthers sagittate. Ovaries 2. Style filiform. Stigma dilated at base, trifid. Seeds in a follicle, immersed in pulp. The flowers of many species are very sweet-scented, and the double-flowered variety of T. cumpestre is a very beautiful annual which is much common in Indian gardens. The deep red pulp surrounding the seeds of this species appears capable of yielding a beautiful colour. The cream-like sap of T. utile, the milk-tree, or Hya-hya of Demerara, is not only of an innoxious character, but said to be very nourishing. It affords a remarkable example of a tree of this suspected family yielding an article of food. Some of the other species are employed as medicines in the countries where they are indigenous. The yellow sap of T. pensacariolata is considered a poison in the Isle of France. The wood is em- ployed in tawdry.

TABERNEMONATUS, JACOBUS THEODORUS, a physician and botanist, was born at Berg-Zabern in Alsace, and was named at an early age to succeed his apothecary in his native place, and thence removed to Paris, where he graduated. On returning to his native country, he took up his residence and practised his profession at Worms. He was made physician to the elector-palatine also in Cassel, and also to the bishop of Speier. He lived at a time when confidence in vegetable remedies in disease was carried to the greatest extent. He diligently studied this department of his profession, and the result of his labours was given to the world in the form of a large folio volume, under the title 'Neue Vollkommen Krauterbuch,' or new complete herbal. He lived to see only the first part of this volume published, which was in 1586. Several editions of this work were afterwards published in the two following years. The second edition was published at Frankfort in 1583, by Caspar Bauhin, and contained descriptions of 5600 species of plants, of which 2480 were illustrated by wood-en-gravings. The best and latest edition published is that of Hieronymus Buhin, which appeared at Basle in 1721. This work appears to have been for a long time a standard authority against the botanical text of the descriptions of the plants are minute, and an immense space is devoted to the consideration of their medical properties. Taberemontanus maintained the principle, which has many advocates at the present day, that Providence causes those plants to be distributed that are the most efficacious for the diseases that arise in it. To such an extent did he carry his views on this point, that he said that at the siege of Metz, in 1562, in which he was engaged as physician to the army, he applied nothing but mugwort to the wounds of the soldiers, on the supposition that it grew in the immediate vicinity of the town. The cuts in the work are badly executed, and are mostly inferior copies from preceding works. This however did not prevent their being reprinted with the letter-press, by Nicolas Bas, the printer at Frankfort, in 1590, under the title 'Icones Plantarum' &c. It is the latter part of his life, Taberenmonatus removed to Heidelberg, where he died in 1590. He also published two other works: the first, on mineral waters, entitled 'Neue Beschreibungen von sien Wasserquellen,' the second, which was published in 1566, and is entitled 'Regiment und Bericht wie man sich in Sterbenslaufen halten soll.'

TABLES. This word belongs to a period in the history of medical knowledge where the logical method is adopted 
more than ever before. It is inextricably connected with the classification of the species of plants according to the true nature of many diseases; and, instead of classifying these according to their essential characters in reference to the single standard of healthy function, selected and arranged such signs and appearances only as were considered characteristic of it and recognized by the patient. The nomenclature founded on this arrangement consisted in naming by uninterpreted symptoms: it involved many breaches of natural affinity, and gave great opportunity for empirical practice. Thus a drug, although a most pulvilinear, could be spoken of as individual diseases; whereas they may on the one hand be joint symptoms of a single malady (as imperfect valvarial action of the heart); or, on the other hand, taken singly or in combination, as a sign, common to many diseases, which might have no other feature of resemblance, and might require even opposite treatment. Such a name is a 'tabes,' and under it are isolated certain symptoms, afforded by the nutritive functions in various conditions of health; the ascertainment of the word being a 'cachexia' (or state of chronic ill-health) attended by emaciation, in which sense it is synonymous with the words 'atrophy' and 'marasmus.'

Emaciation belongs, as a symptom, more or less to many of the third or fourth kind of the diseases, and usually denotes an unfavourable disturbance of the healthy equilibrium between supply and expenditure in the animal economy. Mere leanness, or scarcity of fat (the opposite condition to obesity), is not a sign of disease: it occurs from too much, or too small expenditure or the excrescence, and in most it prevails during those periods, at which the vital powers are most active: it characterises those individuals in whom, and that period of their existence in which, the reproductive function is most efficient, the muscular system most powerful, the respiration most complete, the feelings most excitable, and the intellect keenest. It stamps, in a word, the characters of energy and excitability on its subject, and is an especial indication of the period when the vegetable kingdom is analogous; so does emaciation, or loss of flesh, declare that the system is either drained or ill-fed, and is repairing its deficiency at the expense of particular organs. 1. This state may arise from a deficient supply of material for organic nutrition, either when the food is, in quality or quantity, insufficient; or where the digestive canal is unable to appropriate it; or where (as in the disease which is the subject of the next article) its due absorption into the blood is hindered. 2. It may arise from the periodic discharge from large ulcercated surfaces, exhausts the
material of nourishment; or where a sustained intensity of mental excitement or of bodily fatigue deranges its balance. From this account of emaciation it is obvious that it must accompany very different chronic disorders, which have been confounded in the unscientific word 'tubes'; and from the marked falling away which attends pulmonary consumption [Phthisis Pulmonalis], it is probable that many cases of this descriptively complaint have been so miscalled. The name is now retained for only two forms of disease, and derives its special meaning from the accompanying adjective.

Tubes mesenterica is that weakening of the body which follows co-existing of the mesenteric glands; and Tubes dorsalis denotes an impairment of general health, attended by emaciation, muscular debility, and signs of nervous exhaustion, in persons who have given inflammatory disease.

The treatment of the emaciation and debility which constitute the symptomatic state called 'tubes,' must be adapted to remedy the primary disease. If exhaustive discharges exist, measures must be taken to arrest them, and will vary according to the nature of the gland, maintained by diarrhoea, hemorrhage, or suppuration. If absence of healthy food, or inability of the digestive organs to appropriate nourishment, have caused the emaciation, nutritious diet with careful regard to the intestines, must be considered. The main object of the practitioner is to effect a removal of the noxious influence which has deteriorated the health; and success in this particular, followed by such tonic treatment as may be called for, will re-establish the natural balance of the system.

TABES MESENTERICA. This name is applied to a particular slowly-disorganizing affection of the mesenteric glands, and expresses the marked emaciation which attends it. It is the opinion of practitioners that the nutritive products of digestion are transmitted in their course to the great current of the circulation; and any disorder which destroys or obstructs these organs must, in proportion to its intensity, affect their function, and thus vitiate their affections. The operation of renovation should constantly be commingled with the blood. Hence in part arises the loss of flesh in this form of tabes; but the direct hindrance of nutrition which the disease involves is not the sole though an important cause of the symptom; for the general health, of which tabes mesenterica is but a part, and other co-existing complaints, usually co-operate in producing it.

The disease is one among many manifestations of scrofula; and to the glands of the mesentry is essentially ascribed the same general character. Certain stages of the disease of the neck, with which the eye is more familiar, are to their region of the body. From difference of position and of relations it includes other symptoms and graver consequences, which mark it as an important constitutional tendency, and follows the same general progress, as they. It belongs, like other forms of scrofula, to early life; the ordinary period of its invasion being from the second to the twelfth year. In the Hôpital des Enfants, à Paris, children are received from a year after birth till the completion of sixteen years of age; and M. Guer- sent, the physician of this institution, states that the disease exists among those admitted in the proportion of 7 or 8 to 100; and that it is more frequent among female children than males.

The morbid appearances of dissection of fatal cases are, a more or less complete transformation of the glands into tubercular masses, with various consequent or coincident diseases of the adjoining organs. The glands assume a certain size, and occasionally form a seat of a febrile inflammatory action, under which they merely swell and become preternaturally reddened with blood: but this stage of simple congestion soon induces a further change, which makes them to be described as "tubercular inflations becomes deposited in the tissue of the gland. The dull white granular tubercles, by which the infiltration commences, are gradually multiplied in number or increased in volume; and, in like proportion, the gland, the substance itself is thickened to make room for the encroaching disease, till at length a rounded tubercular mass results, varying for each tumour from the size of a marble to that of an egg. In a still more advanced condition of the disease suppuration frequently occurs in these tumors, and they are then seen to contain the cheese-like matter of softened tubercule mixed with pus.

The abscess so formed excites irritation in its neighborhood; the folds of peritoneum covering it become glued together, and its progress occasionally extends to discharging itself into the nearest intestine, or through the external integument of the abdomen. A certain amount of inflammation is the peritoneum, with adhesions and effusion of serum (ascites), attends these latter stages; and some inflammation and ulceration of the mucous membrane of the intestines are likewise frequently found.

For a particular account of its causes the reader may refer to those of Scrofula. Contamination with scrofulous blood, shown in general susceptibility to the impressions of disease, in slowness and insufficiency of reactive and reparative power, is the groundwork of, and constitutes the peculiar systemic affections which follow this weakness; and in some cases, where this weakness may, where inborn, be aggravated, or, where naturally absent, be artificially produced by a variety of depressing causes; by insufficient or unhealthy food, by neglect of cleanliness and exercise and clothing, by rest, saltow complex, and loss of flesh, with an acceleration by exposure to cold and damp: all of them influences to which the young of the poor in crowded towns are exposed, and with which too frequently an inherited predisposition powerfully co-operates. Derangement of the bowels must be considered a constant symptom of this particular form of scrofula; the irritations, inflammations, and ulcerations of their mucous surface (of which such full evidence is given in the state of the tongue and secretions, and in the tympanitic abdomen) excite corresponding conditions in the tissues of the body in contact with them (precisely as a lesion of the hand irritates the glands of the axilla), and the inflammation so beginning takes a course determined by the peculiar constitution of its subject.

As regards symptoms, it may be observed that in its earliest stages the disease has no signs by which it may be certainly distinguished; that it is not till the glands are so enlarged as to become sensible externally that it can be diagnosed with accuracy.

The symptoms of this disease are essentially those of the intestinal disorder or irritation, which is acting as a cause of the disease: capricious appetite, irregular and unhealthy stools, flatulence or occasional vomiting, loaded tongue, foul breath, harsh skin, saltow complex, and loss of flesh, with an acceleration of pulse, may have existed for some time, before enlargement of the abdomen attracts notice. It will then usually be found that steady pressure on this part causes uneasiness or pain. As the growth of the glandular tumors continues, the stomach is affected, with loss of appetite, for food marked; diarrhoea with mucous stools, increased emaciation, frequent pulse, and evening accession of fever, marking this stage, in which the tumid abdomen contrasts remarkably with the thin, sallow, lifeless face of the patient.

Finally, hectic fever with explosive diarrhea, or acute abdominal inflammation, or the progress of the constitutional disease in other organs, or absolute starvation (atophia), terminates life.

The treatment of tabes mesenterica must be in accordance with the general rules for management of scrofula, and consists in that modified tonic system, to which the name of 'alternative' is given. To maintain a healthy state of the secretions, and to fortify the general health, compliance with these plans of treatment, and the modes of carrying the indications may be thus briefly detailed: cleanliness, warm clothing, and suitable exercise will promote the action of the skin; small quantities of castor-oil will regulate the evacuations from the bowels, if these be sluggish, and the appetite for food. The introduction of rhubarb for stools, improves the character of the intestinal secretions: residence in a dry mild climate, or by the sea-side, a light but nutritious diet, carefully adapted to the varying whims of the appetite of the patient; the mode of carrying out the indications may be thus briefly detailed: cleanliness, warm clothing, and suitable exercise will promote the action of the skin; small quantities of castor-oil will regulate the evacuations from the bowels, if these be sluggish, and the appetite for food. The introduction of rhubarb for stools, improves the character of the intestinal secretions: residence in a dry mild climate, or by the sea-side, a light but nutritious diet, carefully adapted to the varying whims of the appetite of the patient.
sometimes of service, and may be used both by inunction and by internal administration; but its effects require to be most carefully watched, and its employment must be suspended if it increase fever, or cause any irritation of the stomach or bowels.

The result of the sketch will be, in the commencement of the disease, often prove successful in effecting the removal of the tumour and restoring the patient to health; but in the more advanced state the physician can have little hope to do more than restrain the urgent diarrhrhea, banish animal opiates, and retard death by a carefully-regulated and nutritious diet.

TABLATURE, in Music, is the old mode of notation for instruments of the lute kind. For this purpose six parallel lines were used, each representing a string, on which was written to the next above the note to which it was sung the number of the string to which it was sung, and to the next below the note the number of the string to which it was sung the number of the string to which it was sung. The time, or duration, of the notes was marked by characters over the letters, answering to the minim, crotchet, &c., and often, as by Mace, in his Music's Monument, by the notes themselves. There were different systems of Tablature; but the subject is not now worth the trouble which a knowledge of it would demand.

TABLE BAY. [CAPE OF GOOD HOPE.]

TABLE. By a table is meant a quantity of information arranged in such a manner that by looking under one head the general disposition of the whole points out where to look for the matters of information connected with that head: the object being an immediate power of reference to any one fact or result without the necessity for one to resort to or consult others. It is the matter by which we enter the table to look for other matter is called the argument; that which is found by means of the argument has no distinct name; we might call it the tabular result. It would be useful to generalize these things, a table of contents, in which the number of the page or chapter is the argument, and the abstract of the matter contained is the tabular result: in an alphabetical index the principal word, found by means of its first letter, is the argument; and the number of the page in which the matter contained is the tabular result. This is, unfortunately, useless to say much on any tables except mathematical ones. Works containing collections of facts, in which the tabular form ought to be frequently used, are in most instances altogether free from them; and as to indexes, the art of making them is lost: very few books, except those on law, have anything deserving the name. The reason is obvious enough: where proper information is not given, the table shows the facts desired to be given; and a good index points out not only what is in the work, but also that which is not.

When the subject sought for is found by one argument only, the table is said to be of single entry; when two, of double entry; and when the table is such that by the argument one of the entries, it is one of double entry; and so is any chronological table which consists of more than one column.

The method of printing mathematical tables is usually described so closely by the nature of the subject, that no remark is necessary except on the type. The numerical characters, up to about the year 1785, used to be smaller in the body than those now constructed, with distinguishing heads and tails. Dr. Hutton, we believe, first employed the character in which all the numerals are of the same depth, the heads or tails being impressed into the body. This very disadvantageous change was adopted by the type-founders, but only in England: the consequence was that the superior legibility of the antient and of the modern character was lost to a great number of common readers, among those who had to use them. Another circumstance which contributed to this result was the introduction of numerals with thick and thin parts, the superior elegance of which was supposed to be a recommendation. The reason is, that in mathematics it is very difficult to distinguish 3 from 8, and 9 or 6 from 0. Of late years however some works have been published which have used the old type, both as to heads and tails and to the numerals; and their decided superiority over tables of the Huttonian character, even of much larger type, is pretty generally admitted. This is a point of great importance: for any circumstance which produces a wrong result upon the computer's paper is equally to be deprecated, whether it be an error in the formula used by the author of the tables, or an incorrectness of the printer's type; and like most results, and if at all that the tendency to error is of the same bad consequence, whether it be due to the mathematician or the type-founder. This is not true of works of theory or reasoning: it may there be the fault of the reader if he do not correct a mere slip, whether of the author or printer; but in works of reference all the parties to the result are of equal importance.

Since the invention of logarithms, the appetite for tables has not grown with the progress of mathematics. We are bound to respect the opinion of those who, for whatever purposes, that many persons who are even well versed in mathematics are not aware how much assistance they might derive in particular cases from the various tables which have been published. The list which we mean to give does not pretend to be a bibliography of tables, but will nevertheless give information on the subject to all who are not particularly given to mathematical bibliography.

We may divide mathematical tables into general and special. The former are tables of the commonest use, such as astronomical tables, tables of calendars, tables of logarithms, tables of mathematical sciences, tables of longitude, tables of logarithms, and tables of logarithms and trigonometrical tables, and also tables of logarithms. The special tables are those which are used in the higher parts of mathematics, in commerce, navigation, astronomy, meteorology, &c. We may further divide tables into those which deal with the exact sciences and those which deal with the applied sciences. The former have tables of facts; thus the raw observations of astronomy, magnetism, and physics in general are frequently tabulated; with these we have comparatively little to do, since they are rather the materials for the verification of tables of other kinds, than of primary use as tables.

Of simple arithmetical tables we may notice the following:

§ 1. Tables of Multiplication. The oldest we have noticed is one printed in 1610, at Münich (Marbach). There have been several others of great extent, but they are scarce. Hutton's 'Tables of Products,' printed by the Board of Longitude, 1791, go up to 100 times 1000, but are not of the reputation of Carello's 'Riley's Tables of Products,' published anonymously, London, 1775, contain the first nine multiples of all numbers up to 10,000, in a very clear figure, and are useful. Dodson's 'Calculator,' London, 1747, has the same up to 1000, not so conveniently arranged. But a table of this kind is Crell's 'Rechentafeln,' Berlin, 1823, in two thick 8vo. volumes. This contains every product up to 1000 times 1000, so arranged that all the multiples of one number are seen at the same opening of the book, which is a very great advantage. We have also logarithms in many cases with great advantage. There is no table which we so much desire to see reprinted in this country, with a few alterations, which would render it more commodious. An anonymous Table, Paris, 1794, goes up to 1000 × 103; and another, Paris, An VII., the same; a third, Versailles, 1823, the same, with many metrical tables added. Schubler's 'Rechnung's Lexicon,' Nuremberg, 1739, goes to 2400 × 100. Oyoy's Table, Paris, 1824, goes to 1000 × 1000, and that of Cadet, Paris, 1797, 1000 × 1000. [Quarzs Squared.]

§ 2. Tables of Division and of Prime Numbers. Gron, 'Paninotheca,' Berlin, 1798, gives for all numbers under 100, or primes under 400, the quotient and remainder by division. Barlow's 'Tables of Products,' published in 1811, gives the factors of numbers up to 100,000, and the divisor of prime numbers up to 100.33. 'C,' 'Cer- trous Arithmeticon,' &c., Daunart, 1811, gives the prime numbers up to 1,020,000, and the lowest divisor when not 2, 3, or 4. Burchardt, 'Table des Diviseurs,' Paris, 1817, gives the prime numbers up to 100,000, with the lowest divisor of each number when not either 2, 3, or 5. This last is, we believe, the greatest undertaking of the kind. Anjema's 'Tabula Divisionis,' Leyden, 1707, goes up to 10,000; and Piggy's Table, Paris, 1798, the same. Krause, Jena and Leipzig, 1844, has
primes and factors up to 10,000. Newman, ‘Tabellen, &c.,’ Dessau, 1783, has factors and primes up to 100,100.

Guldin, ‘Tables/Tables of a quadrature of the circle,’ which gives squares and cubes, and we believe, cubes also, up to those of 10,100. Guldin, ‘De Centro Gravitatis,’ Vienna, 1635, gives the squares and cubes up to those of 10,000. Pell, London, 1666 (Murhard), squares to that of 10,000. Ludolf, ‘Tetragrammaton Tabulatur,’ Frankfurt and Leipsic, 1690, gives the squares up to that of a hundred thousand; the largest table of squares in existence, and very little known. J. P. Buchner, ‘Tabula Radicum,’ &c., Nurenberg, 1701, gives squares and cubes up to those of 10,100. The interminables to seven decimal places. These were reprinted a little while ago (London, Taylor and Walton, 1823) in the form of square and cubic roots, and reciprocals, up to those of 10,000; the interminables to seven decimal places. These were reprinted from Séguin’s ‘Manuel d’Architecture,’ with a descriptive preface, at Paris, about the beginning of the century. Meintz’s Logarithms, Halle, 1750, contains squares, cubes, and roots up to 10,000. Of these, Leipsic, 1812, goes to the square of 25,200, the cube of 1200, and the square and cube root of 1000. Beyens, Ghent, 1827, goes to the square of 10,000, and the cube of 1000. Schierck, ‘Tafeln, &c.,’ Rohn om Rhein, 1827, has squares up to those of 10,100.

Jouconné, ‘De la Nature, &c. de Nombres Trigonaux,’ Hague, 1762, gave triangular numbers up to that of 20,000, cubes up to that of 600, and showed how to use the tables of squares and cubes. As to higher powers than the third, Hutton and Barlow, in works above cited, give every power of every number up to the tenth power of 100. Barlow gives also the fourth and fifth powers of numbers from those of 100 to those of 10,000.

§ 4. Pure Decimal Operations.—Besides Barlow’s reciprocals (§ 3), the only remarkable tables of which we know under this head are Goodwyn, ‘Table of the Circles arising from the Division of a Unit,’ London, 1823, and ‘Tabular Series of Decimal Quotients,’ London, 1823 (both of squares and cubes, up to those of 10,000, were reprinted from Séquin’s ‘Manuel d’Architecture,’ with a descriptive preface, at Paris, about the beginning of the century. Meinert’s Logarithms, Halle, 1750, contains squares, cubes, and roots up to 10,000. Of these, Leipsic, 1812, goes to the square of 25,200, the cube of 1200, and the square and cube root of 1000. Beyens, Ghent, 1827, goes to the square of 10,000, and the cube of 1000. Schierck, ‘Tafeln, &c.,’ Rohn om Rhein, 1827, has squares up to those of 10,100.

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Of pure trigonometrical tables, independently of loga-

rithms, the following are the most remarkable:

§ 1. Huygens, ‘Canon Mathematicus,’ 1628, contains his and Purbach’s table of sines. Apian, ‘Introductio Geographiche,’ Ingolstadt, 1533, and again in ‘In-

strumentum primit mobile,’ Nurenberg, 1534, gave sines. Ghirard, ‘Table des Trigonometrie,’ 1542. In 1534, Erasmus Reinhold published the first table of tangents. In 1588, the table of secants of Maffoulo was published (posthumously). The three are first united in the ‘Canon Mathematicus’ of Vétra, Paris, 1578, the first trigonometrical tables which resemble the modern

P. C., No. 1485.
1620. John Maire, 'Canon Mesopotolicorum,' etc., Leyden. Such a work is mentioned by Murhard from Seelie. It contained sines of minutes, to 7 decimals, in Netherlandish logarithms; with differences to ten seconds. (?). 1626. Hering's Logarithms, Paris. (Dodsan, followed by Hutton.) Lalande knew nothing of this work, nor Delambre. Sherwin (Preface) says he examined his table by one of Vlaco's, in large octavo, printed at Gouda, in 1626, of which table we find no other mention.

1629. Adrian Vlaco, 'Arithmetica Logarithmica,' Gouda. The whole ten chilaidas of numbers, from 0 to 100,000, to ten decimals. Sines, etc. to every minute.

1632. Cavalieri, 'Directorium Generale Uranometricum,' Bologna. Eight-figure logarithms, the ten first thousand numbers in columns of twenty: the sines, etc. to various divisions in different parts of the quadrant. It would be very convenient to have a short mode of changing these tables. The following could hardly be misunderstood:—Cavalieri's tables are, 0 (1°) 5' (5°) 10' (10°) 20' (20°) 30' (30°) 1° 30' (45°). The table of logarithmic versed sines is said to be the first given. Cavalieri gave logarithms again in his trigonometry (1643); and in his 'Tableta Trigonometrica,' of which we do not know the date.

1633. Gellibrand, 'Trigonometria Britannica,' Gouda. Briggs's logarithms, with his corrections. He did not go on to complete the tables. Sines, tangents, and secants, with logarithms of the two former, all to fifteen places of decimals, except the tangents and secants, which are to eleven. It is to hundreds of degrees, not to minutes.

1634. Theoremata Trigonometrica Artificialia, Gouda. Logarithms of sines, tangents, and secants, to every ten seconds, and to ten places of decimals. Twenty thousand of Briggs's logarithms of numbers are added.

1636. Nathaniel Rose, 'Table Logarithmica,' London. Sines, tangents, and secants to numbers 100 to 100,000, ten-figure sines, etc. to hundredths of degrees. The first table in which attempt at compression was made: the numbers are in columns of fifty, the first figures of the logarithms being at the top.


1634. Frobenius, 'Clavis Univ. Trigon.' The (by that time) usual Briggs's logarithms to seven places.


1636. Gellibrand, 'Institution Trigonometricall,' London. Numbers to 10,000 (seven places?); sines, etc. to every minute (seven places). In the same year, at the end of Well's 'Selenographia,' to which Gellibrand wrote the preface, are tables agreeing with the above description, in everything but the logarithms of numbers, which are carried to 10 places. Are these two different tables?

1635. Anonymous, 'Logarithmetical Table,' London. Attributed to Wingate. Dodsan is followed by Hutton in saying that Wingate published an English edition of his French logarithms. But Hutton never saw any prior to this of 1635, and we can find no mention of anything of Wingate's translated from French, except (in an old catalogue which gives no dates) 'The Construction and Use of the Logarithmetical Tables,' not tables themselves. The logarithms of the table now before us are of six figures, and for the first time unity's figures are at the head of the columns, and the tens down the margin. There are tables of 1632. attributed to Wingate.


1637. Ogilveth's Trigonometry, London, published both in English and Latin in the same year. The logarithmic tables which they have ever since preserved in seven-figure tables.

1640. With John Newton we may very well close the account of the early tables of logarithms. From his date we shall give only those which have had great notoriety, or would even now be of use to any one into whose hands they fall.

1681. Jonas Moore, 'New Systemes of the Mathematicks,' London. The second volume contains a full table of seven-figure logarithms, with the natural sines, etc., and a table of proportional parts. Also, for the first time in England, a complete minute-table of natural and logarithmic versed sines.

1702. John Ward, 'Mathematical Tables,' London. The first work, we believe, in which the proportional parts are in the same page with the logarithms; and the common differences in the trigonometrical logarithms made common. Second edition, 1717; third, revised by Gardiner, and the best, 1742; eighth and last, 1771, viz:—noteworthy—the most inaccurate table Hutton ever met with.

1717. Abraham Sharp, 'Geometry Improved,' London. A large table of arcs of the segments of circles; but it contains logarithms of all numbers to 100, and all primes under 1100, true to sixty decimals. Also an immense mass of results on the regular solids.

1742. Dodsan, 'Antilogarithmic Canon,' London. This work is unique of its kind: it contains the numbers, to ten figures, of all numbers from 00001 to 100000; the author corrected the faults in most copes with his own hand. Harriot began such a table, according to Wallis, and Dr. Pell told Wallis that Warner had finished the table, and that it was in the hands of Dr. Halley. It was never published, and is probably lost.

1742. Gardiner, 'Tables of Logarithms,' London. Numbers 1—101001, sines, etc., 0 (1°) 72' (10°) 45', all to seven places, with his logistic logarithms, etc. Rare, and much esteemed for accuracy: the author corrected the facts with his own hand.

1770. Reprint of Gardiner at Avignon, by Pecenx, Dumme, and Blanchard, with the first four degrees to single figures, and the last to hundredths (Laisne, manuscript of 1763). There was a reprint of some sort at Florence, in 1752.

1772. Gherli's Logarithm, Modena. Very much the same as Hutton's in their contents.

1777. Schule, 'Sammlung Logarithmischer,' Berlin. This collection is highly spoken of. It contains the last published hyperbolic logarithms of sines and tangents.

1778. Hutton, 'Mathematical Tables,' London. Many editions. A very correct set, with sines, tangents, etc., reversed sines, complete, both natural and logarithmic. For this reason, with seven places, and can have but one book, there is none better.

1782. Michael Taylor, 'Tables of Logarithms,' London. In the trigonometrical part the sines and tangents are to thirty places. They have hardly been corrected. Many of the tables of this work have been published in various Nautical Almanacs.

1783 and 1785 (new tirage, 1821, with many errors corrected). Callot, 'Tables Portatives,' etc., Paris. The first edition was substantially that of Gardiner; the second, stereotyped by Firmin Didot, is one of the most correct and convenient, as well as extensive works in existence: many persons prefer it to any other. It contains the usual seven-figure logarithms from 1 to 100000—common and hyperbolic logarithms, each to 20 decimals, up to 1200—trigonometric logarithms, each to 40 decimals, at hundreds, first, second, and third differences, from 100100 to 101179—numbers to logarithms, common and hyperbolic (to 20 figures), from 00001 to 00179, with the same differences. Common differences to 61 decimals, and hyperbolic to 43 to all numbers from 1 to 100000. It contains for numbers from 999690 to 9000621—multiples of 2:0258... and 43429... to 100 times—arcs to 25 decimals, for both sexagesimal and centesimal division—sines and tangents 0 (1°) 5' (5°) 10' (10°) 20' (20°) 30' (30°) 1° 30' (45°). The remaining places up to 14, the first seven being in the last table—proportional parts—sexagesimal seven-figure logarithms of sines and tangents 0 (1°) 5' (5°) 10' (10°) 20' (20°) 30' (30°) 1° 30' (45°) (logarithmic logarithms in the margin). These tables are not, not extremely, correct in all parts, except in the latest tirage. They were the first in which the line was broken at the change of the third figure of the logarithm of a number.
The first volume contains a reprint of Kepler's *Logarithms*,
the sixth and last of Napier's work of 1614, and John
Simpson's logarithms of numbers.
1794. Vega's edition of *Vilacq*, *Thesaurus Logarithmorum*,
Leipzig, 1794. See *Vilacq* of 1826 and 1833. A
very correct work: a duotone was offered for every error
detected.

1797 and 1812. Vega, *Tabulae Logarithmicae-Trigonometricae*,
Leipzig. The usual logarithms of numbers, sines, &c.
0 (18°) 30(10°) 6/2' (1') 490-degrees—dividers
and primes already noticed—eight-figure hyperbolic logarithms
from 10,000—powered hyp. log. 10, and their common logarithms
(from ex-
ponent '01 to '100)—squares and cubes of numbers up
to those of 1000, &c.—logistic logarithms, binomial co-
efficients, and astronomical tables various. There are
erious smaller editions from Vega, as at Leipzig, 1826
and 1828.

1800 or 1801. (An IX.) Delambre and Borda, *Tables
Trigonometriques Decimales*, Paris. These tables were
corrected from the second Edition *Dubuis One*, still
unpublished.* (Prox.) They contain the common
logarithms of numbers, 10-decimal logarithms of numbers from 1
to 1000, and from 100,000 to 102,000; 10-decimal logarithmic
sines 0 (10°) 10°; 11-figure hyperbolic loga-
ithms from 10,000 to 40,000, ten sets of
logarithms of sines, tangents 0 (1°) 0° 10° 100°
centesimal.

1814. Barlow's *Tables*, London. Here are found eight-
figure hyperbolic logarithms up to that of 10,000, cal-
culated from the primes in Vega. They had been
pre-
corrections given in the first Professional
School, Copenhagen, 1824, to the nearest
one-third of a figure. They were printed in seven
figures are more conveniently used than those of
six, owing to the saving of calculation which is made by
the presence of proportional parts.

1814. Gruen's Logarithms, Berlin. Contains also
squares, cubes, square roots; and cube roots up to 1000.

1817. Babbage, *Tables of Logarithms*, London. Stereo-
typed. Seven-figure logarithms of numbers only,
now exceedingly correct. Printed on various coloured
papers: Callet's stereotyped sines were at one time
printed on yellow paper in France to accompany them;
but the French paper was of so bad a colour, that we
believe the experiment was not continued. There are:
seven-figure logarithms of angles, Caledon.

1817. Salomon, *Tables Logarithmicae*, Vienna. A
large collection: contains also squares, cubes, square
roots, cube roots, up to those of 1000; and divisors up
to 102,011.

1817. Hantsch's *Tables*, Vienna. Ten-figure logarithms
of primes up to 15,391; squares, cubes, square and
cube roots, up to those of 1200; factors up to 16,277;
and others.

A complete six-figure table: rather common in England.

An imitation of Michael Taylor's, sines and
tangents to every second.

form, New York. Seven-figure logarithms throughout:
half-minute intervals through the greater part of
the tables of sines, &c. The logarithms of numbers broken
as in Callet. We dislike this mode extremely; but many
find it convenient.

1831. Lalande, *Tables Logarithmicae*, Paris. Stereo-
typed in 1805; 1831 is the date of the first tirage with all
corrections made. Five-figure tables throughout, and no
mistake has ever been found in them, though it is said a
new discovery detection was noticed.

Six-figure logarithms, with other tables.

1830. Anonymous (Stait, Marshall, & Co.), *Lo-

garithmic Tables*. A very neat reprint of Hassler with-

* There was once a commencement of the printing made, and we have seen
some of the proofs sheets.

out the (to us) objectionable breaking of the lines in the
logarithms of numbers.

1839. Anonymous, *Taylor and Walton, under Useful
Knowledge Society*, *Stereotypy*. A reprint of Lalande
(tirage of 1831) with a few additions, closely compared
with other tables. No error was found in Lalande, and
none has hitherto been found in this reprint. The old
numeral type is still used in the compilation of this work.

1840. Anonymous (Taylor and Walton). Four-figure
logarithms on a card. *Stereotypy*. Reprinted of a table
originally privately circulated among practical astron-
omers. (See *Companion to the Almanac* for 1841.)


1840. Farley, *Six-figure Logarithms*, London. Sto-

erotypy. An excellent table for those who want six
figures.

1841. Gregory, Woolhouse, and Hann, *Tables for Nau-

tical Men*, Contains five-figure logarithms, neatly printed;
the only instance we know in which five-figure logarithms
have proportional parts.

1841. Riddle, *Tables*, &c. The six-figure logarithms
from Mr. Riddle's well-known work on navigation. Stere-

typed.

Of the misuse of tables, no instance is more common
than that which consists in taking tables of too many
places of figures. Four are very often enough, more than
that is generally sufficient. Cases are not at all rare where
seven figures are more conveniently used than those of
six, owing to the saving of calculation which is made by
the presence of proportional parts. In purely trigonome-
trical calculations, the advantage of six figures over five
is sometimes marked; and in the more complicated
problems, when five or seven figures are suspected to be
insufficient, to have recourse to seven at once, which, we are
satisfied, is a saving both of time and thought.

§ 7. The next tables which we shall mention are those
which are wanted in the higher mathematics.

Extensive tables of *elliptic functions* are in Legendre's
*Treatise des Fonctions Elliptiques*, 2 vols. 4to., 1825 and
1826. The *factorial function*, $F_r$, is tabulated in the
same work; and the *exponential function* or *exponentials of
the same author*, Paris, 1817, in which several other
definite integrals are also tabulated. An abridgment of
this table (with ready means of restoring it fully) is in the

Tables of the integral form of $F_r$, or $1 / (1 - x)^r$, or
rather of the logarithms of the values, are given by C. F.
Degen, *Tabularum Enneas*, Copenhagen, 1824, up to $x = 100$,
for the first time in the Encyclopedia Metropolitana, and
the integral \[ F_r = \int \frac{1}{1-x} \, dx \] was first given by Kramp, with logarithms of
the values, in *Analyse des Refractions Astronomiques*,
Strassburg, 1799. This table is reprinted in the Ency.
Metrop., *Theory of Probability*. The form in
which this integral more usually occurs in the theory of
probabilities (with the factor $2 - a$) was given (by Pro-

essor Ecke, we believe) in the Berlin *Astronomisches
Jahrbuch* for 1834, from whence it was copied into the
article in the Ency. Metrop., above noticed; and (with
extensions) into the *Essay on Probabilities and Life Con-
tingences* in the Cabinet Cyclopaedia, and into the article
on Probability in the new edition of the Encyclopaedia
Britannica. A few other definite integrals have been
published: one very useful one, $\int dx / x$, by Soldner,
*Nouvelle Fonction Transcendente*, Munich, 1809, copied

The integrals known by the name of *Spence's Logarithmic
Transcendents* are in the work with that title (Edinburgh,
1809; Sir J. Herschel's edition, London, 1840). There
are a few of the integrals necessary in optics scattered
through the Memoirs of the Institute and of the Cambridge
Philosophical Society (in memoirs by Fresnel and Mr.
Airy). Perhaps we should also mention the tables for the
solution of indeterminant equations of the second degree.
Of these there is one in Legendre's *Theorie des Nombres*;
another has been given by Jacobi; and a third, by Degen,
called *Canon Pellianus*.

As to astronomical tables, it would be impossible to give
any account of the enormous mass which exists or has
existed; nor would such a book be of any use, except
for astronomical history. They may be divided into two classes: first, the tables of observations published by public or private observatories; secondly, tables of tabulated data, constructed by the astronomers, in the deduction of future predictions. As to the former, every well-conducted observatory in full work publishes periodically (at intervals of one or two years) its volume of observations, latterly with their reductions. As to the second class, they are the best materials of the astronomer, but of the computer of his ephemeris, who supplies the necessary predictions for the current year. In England the Nautical Almanac gives in the preface full references to the tables employed—place by place, containing the names of Institutions, of sun, moon, planets, or stars. For general purposes connected with the elements of the solar system, see Bally, 'Astronomical Tables and Formule,' London, 1827.

The tables in the other physical sciences are mostly collected, we believe, generally speaking, by no means so complete as they might be. The value of tabular information seems to be not sufficiently felt. A large portion of every book of chemistry, for instance, is a detailed statement in words of length of facts which might with great advantage be made the components of a table.

§ 8. It remains to speak of commercial tables, a subject of great interest in this country, which has produced a great number of mathematical tables, part of which is connected with this subject may be divided into those intended to facilitate calculations of money with regard to other countries, and with regard to transactions in this country; to which we must add, as distinct heads, tables of annuities and mortifications, of coin and equivalents of coin, and metric tables of weights and measures. Of all these we shall only mention a very few.

The most complete work on foreign exchanges, and on the weights and measures of England as compared with those of other countries, is 'The Universal Cambist,' &c., London, 1821 (2nd edition), 2 vols. 4to. (with supplements), by the late Dr. Patrick Kelly. We may also mention 'Tables of Arbitration of Exchanges,' London, 1817. These tables began to be published at the beginning of the seventeenth century. The earliest we have met with is Richard Witt, 'Arithmetical Questions,' London, 1613, which, before the introduction of the notation of decimal fractions, gives tables and breviate containing the significant figures, with rules equivalent to the management of the decimal point; and Clay's 'Briefe, &c., Tables,' London, 1624. In the first half of that century we find in catalogues the works of Fisher, Butler, Withington, Lucas, and others, containing tables of interest, annuities, or leases. For the tables known by the name of Accrord, see MORTALITY. The tables of leases, Cambridge, 1686, had the approbation of Newton, who, however, with some dissatisfaction, had been reprinted, and styled Newton's. Under this impression they still are sold, as there are persons who believe they were constructed by Newton. In 1728 the first really extensive tables of interest were published by John Smurt. The results are interpolated for half years, which give the tables the appearance of being calculated for interest payable half-yearly; but the fact is that yearly payments are supposed. A second edition of this work, enlarged, by C. Brand, London, 1780, has the reputation of containing many errors. Mr. Baily's 'Doctrine of Interest and Annuities,' London, 1808, is as extensive as Smurt's for whole years, and as correct; and the Tables of Leases, London, 1807, by the same author, contain the simple cases which the name implies, tabulated by themselves. 'The Doctrine of Interest,' by Francis Coopax, London, 1825, contains the real distinction of yearly, half-yearly, and quarterly interest; these tables are repeated in the same author's work on Population, London, 1833. Mr. Hardy's 'Doctrine of Simple and Compound Interest,' London, 1839, contains rates of interest increasing by \( \frac{1}{4} \) per cent. from \( \frac{1}{2} \) up to 5 per cent., with succeeding integer rates. All the standard works on life annuities contain tables of compound interest.

There seems to have been a tendency at the beginning of the last century to publish commercial tables in copper-plate, probably with a view to secure the advantage which stereotype has since secured in a better form. Thus we have the 'arithmetical tables' of C. Bardon (Roy. Soc. library) without date; Lostau's 'Manual Mercantile,' second book (first never published), London, 1733; Rev. G. Brown's 'Arithmetica Inferiiria,' London, 1717; the two being chiefly intended for merchants, and containing tables and fractions useful in money transactions, arranged under heads. The following may be mentioned as containing hints which might even now be useful: Benjamin Webb, 'Tables for Buying and Selling Stocks,' London, 1759; 'The Complete Almanac,' London, 1762; Hayes's 'Moneyed Man's Guide,' a table for Computing Dividends, London, 1728. The French have a large number of tables answering to our ready reckoners, under the name of table (a word of the same use with them as Cockler with us). Among these one has seen one of them of the decimal character, in which a metal plate with rectangles pierced in it serves, on one rectangle being placed over the integers of the number required, to make another separate those of the number to be found.

On the standard tables of life contingencies we refer to Mortality, adding that since the publication of that article, the Amicable Society has published tables of its experience by distributing them among its proprietors. The work of Mr. Jones on Life Annuities, in the 'Library of Useful Knowledge,' which is now brought nearly to a close, contains more tables than the old standard works as well as others, and is the first in which extensive tables for what is called Barret's Method are furnished, both for one and two lives.

The practice of stereotyping tables is one which should be strongly enforced, if it were not that publishers seem unwilling to trust them to a machine, while the table derives no authority from the goodness of the first, because the printer, who is, as already observed, as important a person as the author in the matter of tables, has again stepped between the maker and the latter and the public. In reading the proofs of important tables, it is desirable that they should be employed, one to read from the manuscript, the others to watch two separate proofs, without communication with each other, as done in the Nautical Almanac Office, and to place a copy of the proofs in the place which is taken from the stereotype, the other proofs being taken with the previous proofs.

Persons who have to correct the proofs of tables alone should be furnished with the manuscript as near as possible to the proof by folding it conveniently; even if they were altered after every two or three lines, so as always to have both manuscript and proof under the eye in one position, it would not give more trouble than would be well repaid. Double and treble annuity tables would be passed by to; no mistake is so likely to be made, either by the compositor or the reader, as 744 for 774 and the like. This, and misplacing the order of the figures, as 012 for 102, are the things which it is most difficult to avoid. Again, of the remaining mistakes, all the mistakes in columns which are more difficult one should be looked at first, for the mind is apt to allow knowledge derived from the more easy to give help in interpreting the more difficult. Thus if the type be intended to read after the manuscript (a very common thing with our thick even-sized manuals), make out the proof first, and then look at the manuscript; et vice versa. If two readings be given, vary the mode; the following may for instance be the plan adopted: if the manuscript column contain a, b, c, &c., and the printed column A, B, C, &c., look at a, then compare it with A, then at B, compare it with b, then at c, compare it with c, and so on; the order of inspection being a, B, b, C, c, &c. Some persons examine best by the eye alone, others by the ear alone, and some by both in turn. Each one must do for himself what practice is best for him; but whatever it may be, it should be varied. Alteration of position, motion of the hand or foot occasionally to mark the transition, alternation of the tone of repeating; &c., are useful; it is hardly credible how much the mind is affected by this. For much the perceptions are dulled by the monotonous comparison of one column of figures with another, or how many and how gross errors both eye and ear, when tired, will suffer to pass unnoticed. Persons who are not much accustomed to study will do very well as follows. Let them request the printer to make, at his own discretion, a certain number, say three, of mistakes (author-traps) in every page, carefully registering them, but not on the manuscript. The author may then be certain that he ought to detect three mistakes in every page, and will know that he has been careless if he have
n that number at least. But at the same time, the author who has no reason for confidence in himself may very safely leave good manuscript tables entirely to the printer, if he make the latter understand that he does not intend to correct till all is printed off, and will require every page containing an error to be cancelled. No good printer would now allow to engage to furnish a fac-simile of a manuscript, on the simple condition of being allowed to refer to the author for decision as to any doubtful word or figure in the writing; and the accuracy with which the first-rate London printers turn out their proofs is surprising. There is reason to believe that the most able and experienced printer who ever passed in judgement on manuscript table-matter more times than we should otherwise have thought necessary, merely because the total absence of detected error left an unsettled point whether it was the case in the proof, or a temporary suspension of our own quickness of perception, which caused the absence in question.

Catalogues of tables (separate) may be seen in the catalogue of the Royal Society's Library; in Murhard's Bibl. Math., in Lalande's Bibl. Astron. (in virtue of the index); but there is nothing approaching to even a moderately perfect catalogue.

**TABLES, ROUND.** The most famous Round Table is that of King Arthur, which is said in the old romances to have been placed, it is thought, on the summit of Pendragon, Arthur's father, from which it passed into the possession of Leogian, or Leodegrance, king of Camladel, or Càrmalide, whose capital was Carhaie; and then came to England, where it was finally placed, as is probably shown in that of that monarch. The romance of the 'Morte d'Arthur' says that Merlin made it 'in token of the roundness of the world;' according to the metrical romance of Merlin, it was made in imitation of one which had been set up by Jesus of Arimathia in commemoration of that at which the twelve apostles ate the last supper with their divine Master. The Round Table is not mentioned at all by Geoffrey of Monmouth, either in his 'Chronicle,' or in his 'Life of Merlin' in Latin verse; but it is noticed by his contemporary Wace in his Roman de Rou 'Ois d'Angleterre.' The Round Table was 'intended,' to quote the analysis of the romance of Merlin given by Ellis (Specimens of Early English Romances, i., 249), 'to assemble the best knights in the world. High birth, great strength, activity and skill, fearless valour, and firm fidelity to their sovereign were indispensable requisite for an admission into this order. They were bound by oath to assist each other at the hazard of their own lives; to attend upon each other at all times, in the hour of death; when necessary, a life of monastic solitude; to fly to arms at the first summons; and never to retire from battle till they had defeated the enemy, unless when night intervened and separated the combatants.' There are different accounts of the dimensions of the Round Table, which indeed appears not to have been always the same. The romance of Merlin, which states that Uther had no power to fill all the seats, makes that king nevertheless in his moments of despair and doubt, as a spoken of forming the number of the order under Leodegrance. The 'Morte d'Arthur' makes Leodegrance say, in surrendering it to Arthur, 'I shall give him the Table Round, which the Uter Pendragon gave me, and when it is full complete, there is an hundred and fifty four knights and five, and, as for an hundred good knights, I have myself, but I lack fifty, for so many have been slain in my days.' Of the fifty knights that were wanted, Merlin was at the moment only able to find twenty-eight for Arthur; but some were not afterwards perceived to be knights. Of the fifty-nine knights complete number under Arthur to have been only a hundred. It is asserted by some of the chroniclers that some time before Edward III. instituted the order of the Garter, he held a Round Table, in imitation of that of Arthur, with a chamber in which it was placed, still known by the name of the Round Tower; and though this story is rejected by Antis, in his 'Historia Regum et Gildus' (Hist. Antiq. Angl. Eng. Poet., ii., 87) gives some reasons for thinking it probable enough. Bishop Percy, in his 'Reliques of Ancient English Poetry' (1. 41, 42), remarks that the round table was not peculiar to the reign of King Arthur, but was common in all the ages of chivalry. The placing a great tournament (probably with some peculiar solemnity) was called holding a Round Table.' And he quotes a passage from Dugdale on which that learned antiquary, describing a tournament held at Kenilworth by Roger de Mortimer, in the reign of Edward I., says, 'Then began the Round Table, so called by reason that the place wherein they practised those feats was environed with a round wall, and within that wall appeared a Round Table, where Matthew Paris frequently calls jousts and tournaments Hasteulitae Mense Rotundae. These round tables were probably a contiveness on the principle of the modern Round Robin, to prevent any dispute about precedence and order of place among the combatants of different parts of England which are still called Arthur's Round Tables.

**TABLES, TWELVE.** [Twelve Tables.]

**TABOR, MOUNT (תָּבֹר), LXX., and Josephus, 'Ira-ophage,' now called Jebel-es-Tur, is an insular eminence, about 1000 feet high, according to the most probable out of several different calculations, on the eastern side of the great plain of Esdraelon in Palestine. It lies about two leagues south-east of Nazareth. It stands out alone from the high ground which surrounds Nazareth, and on the north it has at its foot an arm of the great plain of Esdraelon, which sweeps away north-east to the lake of Galilee, or the Sea of Tiberias. The Mount Tabor, as seen from the south-west, is a segment of a sphere; from the west-north-west it presents the appearance of a truncated cone. The ascent is long and winding, occupying a distance of about a mile; the ascent is of step construction; in some places steps are cut in the rock. The sides have a good soil, and are covered with clumps of oak-trees. 'The proper summit,' says Dr. Robinson, 'consists of a beautiful little oblong plain or basin, twelve or fifteen minutes in length from north to south, and eight or nine in breadth. This is skirted on the south-west by a ledge of rocks of some altitude, covered with foundations and ruins, and on the north-east by lower rocks; and this higher ground on both sides is thickly overgrown with shrubs and vines; and where the basin itself lies in grass without trees or ruins.'

There are considerable ruins on the summit of the mountain. There are traces of a thick wall all round the top, the masonry of which seems not later than the time of the Romans. This is very likely to be the wall built round the mountain by Josephus, in the Jewish war. (Vit., § 37; Bell. Jud., ii., c. 20, § 4.) On the ledge of rocks at the southern side of the summit, particularly at its eastern part, there are ruins of an old fortification, and ruined dwelling-houses. There is a gateway, of Saracenic architecture, called the 'Gate of the Wind.' It is known that churches and monasteries stood here both before and during the Crusades. There is a small vault on the southern part, where from of old, at the celebration of the annual mass in memory of the Transfiguration, and on the north side the Greeks observe the same festival among the ruins of a church. The festival of the Virgin is also celebrated here, the Greek priests from Nazareth, and a multitude of pilgrims. There are many cisterns on the summit; most of them are dry, but in one Dr. Robinson found good water.

All travellers describe the view from Mount Tabor as very beautiful, but they differ about its extent. Dr. Robinson, who spent a whole night on the mountain, and saw the view both in the evening and in the morning, states that on the west it embraced the western part of the plain of Esdraelon, but the ridge of Carmel almost entirely barred the view. On the north-east, there appeared Safed and its mountains, overtopped by the snowy summits of Jebel Ez-Sheikh (Mount Hermon); between the mountains of Safed and the foot of Mount Tabor to the north-east branch of the plain of Esdraelon. Though only about 200 feet above the sea, Mount Tabor could be seen, the whole outline of its basin was clearly visible; and beyond this the table-lands of Jaffin and Haerin, and to the south of them the mountains of Bashan behind Mount Hermon, with the lake of Tiberias on the north the view is almost immediately bounded by the mountains of Duhay (Little Hermon) and Gilboa, the latter appearing over the summit of the former. On the south-east the view extends far down the valley of the Jordan. Dr. Robinson adds that a line drawn from Tabor to the summit of Little Hermon marks the division between the waters which run eastward into
the Jordan and those which flow westward through the plain of Esdraelon into the Mediterranean.

Sue Luke, still great stands Winer's. Sometimes situated, surrounded 18.) There and escaped reduced 50,000. The present habitants were fortified, in 1420. The mountain a territory of Persia, which was the in 1821. In those hard winters many trees lose their lives, and whole caravans are frequently exposed to imminent danger. The easterly winds blow through the narrow valleys of the table-land with a violence of which the inhabitants of Europe are scarcely aware. To the great quantity of snow in winter the fertility of the soil is owing; for there are not more than two or three showers between March and December. The air during this time is so extremely dry, that steel, which is continually exposed to the air, becomes itself entirely unknown. The heat of the summer is very moderate. Between the 19th of June and the 1st of July the thermometer only once rose to 76°. Sometimes indeed hot winde blow from the south-west, and raise the temperature of the air considerably, but they are rare, and do not continue for a long time. At other times the air is always pure, dry, and bracing.

Tabriz is built on a plain of moderate extent, surrounded on the north and south by ranges of high hills, which rise abruptly, and on the east and west by a plain, with a few mountains. The most considerable river is the Luchnitis, and there are many small lakes or mires. The soil is fertile, and produces corn, flax, and culinary vegetables. Oxen and sheep are very numerous, and the mountains are rich in silver and other minerals, and in precious stones. The chief manufactures are of woolen, cotton, and linen.

Tabor, the capital of the circle of Tabor, is situated in 48° 24′ N. lat. and 14° 30′ E. long. It stands on an eminence, and gives its name to a very beautiful spot, resembling a romantic country. It is said that the castle of Tabor was built in the year 774, by a nobleman named Koten, round which the town gradually arose, but it was totally destroyed in 1208. In 1420 it was rebuilt, and strongly fortified by the orders of the Grand Seigneur, which was called, after the town, Taborites. The principal buildings are the cathedral, which is worth seeing, and an Augustine monastery. The town has 4500 inhabitants, among whom there are many Jews. Their chief occupation is weaving linen and woollens, and they have some trade in corn. (Blumenbach, Die Oesterreichische Monarchie; R. E. Jenny, Handbuch für Reisende im Oesterreichischen Kaiserstaate.)

TARABILBA, the capital of Azerbaijan, a province of Persia, is situated, according to Montheil, in 38° 4′ N. lat. and 46° 3′ E. long. The town is said to have been founded by the wife of the famous Caliph Harun al Rashed, in 791. It was repeatedly destroyed by earthquakes, and in 1658 by the Turks, who burned it, but it was again restored. In Chardin's time (1673) it was a very large town, equal in size to Leophas, and containing 500,000 inhabitants; but this statement was made by Chardin on the information collected from the natives, and is apparently great exaggeration; even now the natives give to the town a population of 250,000 individuals, though, according to the estimate of travellers, it hardly exceeds 50,000. During the last century Tabriz was more on the decrease than on the increase, it has sunk to a very low state; but at the beginning of the present century, Abbas Mirza, the son of the shah of Persia, was made governor of Azerbaijan, and organized the military force at Tabriz, which he intended to oppose to the progress of the arms of Russia. Since that time the town has greatly improved, though the larger part of the area enclosed by the ancient walls is still covered with ruins and wretched huts.
Khoi. Their value is at least equal to that of the goods brought from Russia. Many English goods reach Tabriz by the caravan which are continually going between that town and Constantinople, and pass through Erzerum, Tokat, and Angora. The export by this road consists chiefly of rice, wool, hides, sheep and goat skins, furs, carpets, shawls, and some minor articles. It is stated that the foreign demand for arrow-root has caused a great traffic into Persia goods to the value of a million of pounds sterling. The merchants of Tabriz are at present not immediately connected with India and Bokhara, but receive the goods of these countries by the way of Herat and Tehran.

(Tacca.)

Water-Lily.

The plant is brought into commerce largely by the Chinese natives in the islands of the South China Sea. It is called *Tacca macrozamia,* and almost all the botanical names of the species are derived from it. This is largely used for food by the natives of the Philippine Islands. The tubers are first boiled in water, while the highly nutritious fascia, like arrow-root, is then separated, and, like sago, is employed as a food by the inhabitants of the Malayan Peninsula and the Moluccas. In Otahite and some of the Society Islands they make cakes of the tubers of *T. parasifera,* which are the *Tacca poyrungan* of the sailors; some navigators. They form an article of diet in China and Cochín-China, and also in Travancore, in India, where, according to Dr. Ainslie, they attain a large size, and the natives are in the habit of chewing them.* (Royce’s Illust., p. 378.) The petals and stalks boil for some time are also used as articles of diet in China and Cochín-China. In Otahite the plant is called *tua,* its fascia is largely prepared and is sometimes preferred to the great quantity of arrow-root grown in Tahiti, under the name that by the native converts at the missionary station and exported to London. It is also sometimes called Otahite salsap. This plant must not be confused with the *Arrun macrorizum,* the tuberous root-stalk of which is also edible, and when prepared is called *saks,* which similarity in name and in uses has frequently caused confusion, and the mistaken of one plant for the other. In Singapore, *Tacca crystallina* is called Water-Lily.

**Tacca** is a small natural order of Endogenous belonging to the epigynous group. There are but two genera belonging to this order, Taccia and Atacchia. The species are large perennial herbaceous plants, with a tuberous root, a short stem bearing scapes, and having exalate, radical, petaloid, pinnatifid, rarely entire leaves, with curved parallel veins. The flowers, which are placed on the top of a single scape, are in umbels, and are united; the tube of the perianth is superior, and united to the germen; the style is equal; the ovary unequal, persistent; stigmas 4 or 5; filaments dilated; ovary 4- or 6-locular, with numerous attached carpels, with five parietal polyserose placents; styles three, connate; the fruit baccate, with seeds lunate, striated, and the embryo situated on the outer surface of the placenta. Some difference has arisen amongst botanists as to the position of this order in a natural system. Bartling refers them to Exogenes, but almost all other botanists have referred them to Endogenes. Blume considers the order as one standing between Araceae and Aristolochiaceae, agreeing with the former in habit and the latter in its superior perianth. On account of its inferior fruit and the presence of a spadix, it is placed by Lindley in its epigynous group.

The species are found in the hotter parts of India, in the South Sea Islands, and in tropical Africa. The tuberous roots, as well as the enlarged peels of many of the species, when cooked, are frequently used as food.

**Tachydromus,** Illiger’s generic name for the *Courrier Birds, Curvostis of Laccipede, Courve-vite of the French. (Courvoisom.)

Mr. Scrope places this form among the *Charadiadea* (Plovers), and Mr. Swainson arranges it in the same family, giving it a position between *Oedicnema* and *Glauroscoldia* (Patricole), and it stands between the same genera and in the same family in the Birds of Europe and North America of the Prince of Conno.

Mr. G. R. Gray makes the *Curvorne* the second subfamily of the same family. The *Curvorne* are placed by him between the *Oedicnema* and the *Charadiadea,* and comprise the following genera:

- *Curvornus,* Lath. (Charadiadum, Gr. Tachydromus, Ill.)
- *Oreophilus,* Gould; *Ortgodoro,* Vieill. (Hemipodura, Sw.)
- *Orygys,* Steph. (Piervulon, Vieil. (Charadirea, Gr.)
- *Curospur,* Wagi. *Hyas, Gleger. Ammopolia, Sw. Cheilo-

*Oriopus,* Rips. Tachydromus is also used by Daubin to designate a genus of lizards.

This saurian is placed by MM. Duméril and Bibron at the head of their first group of *Autosnura Cordontides,* viz. *Cordotis.*

Generic Character.—Tongue with a base not sheathing, moderately extensible, divided at its extremity into two small flattened filaments, with a surface offering papillose or toothed points. Parched teeth, often more or less rounded. Gastric Maxillary teeth conical, simple. Maxillary teeth compressed, the first simple, the succeeding ones tricuspidate.

N.B. Tachydromus is also used by Daubin to designate a genus of lizards.
somewhat large and nearly circular; the tympanic membrane is extended within its circumference.

The surface of the head is entirely covered with plates, absolutely as in the Lizards properly so called. There is a rostral plate, two naso-rostral, an inter-nasal, two fronto-parietals, a small inter-parietal and an occipital equally small. The palpebral or supra-ocular regions, which are bony, have three plates of different sizes. On the frontal region there exists a small naso-frontal plate and two large post-nasal frenals. One of the upper labials, which is situated below the eye, occupies not only a very large longitudinal space, but ascends to the orbital border.

The under part of the neck presents a scalloped collateral, but in general it is but little apparent. Scales, and not plates, protect the temples.

The scallic covering of the upper part of the neck, of the back, and of the tail, is composed of great carinated, angular pieces, more or less imbricated, and rather distinctly disposed in transversal rows, especially the caudal ones, which are, consequently, verticillated.

The sides, on the contrary, present only very small scales, having a granular aspect. The lower regions of the neck, the breast, and the belly are protected by rhomboidal imbricated scales, which are smooth or carinated, but always disposed in longitudinal series. There are lozenge-shaped imbricated scales on the arms and the front of the hind feet; the under part of the anterior limbs and the posterior surface of the thighs are furnished with granules. The pre-anal region is covered in great part by a single plate surrounded with small scales. The base of the tail presents no kind of spines nor spurs; but there exists in each groin one or two tubular crypts.

Only two species are at present known: Tachydromus sexlineatus and Tachydromus japonicas.

Tachydromus sexlineatus.

The first of these is olive above, and on each side of the back, from the angle of the occiput to the lateral part of the base of the tail, is a beautiful white stripe between two black lines; certain parts of the sides of the neck and sides, those which are furnished with granules, are sprinkled with pretty small black spots with a white eye. The other regions of the lateral parts of the neck and the trunk are of a bluish tint with golden reflections. Between the nostril and the eye a black line; two others of the same colour, separated by a white stripe, extend longitudinally on the temple. The lower part of the head, of the neck, of the back, and of the belly, are very pure azure-white. The tail sometimes is simply olive; sometimes, on the contrary, it presents a brilliant copper, or even golden colour. Length about a foot, of which the tail measures about three-fourths.

Locality.—China, Cochin China, and Java. (D. and B.)

TACHYGLOSSUS, Illiger's name for the Echidna.

TACHYLYTUS, a mineral which resembles obidian, and has also been supposed to be similar to isoppy. It consists of plate-like particles of a black and massive, or small, compact, brownish-red. Hardness 6-5. Translucent, opaque. Lustre vitreous, vitreous-resinous. Colour brownish and greenish-black. It is found in small masses at Sisabuhí, near Götingen, in basalt and wallce. It does not appear to have been analysed.

TACHYPETES, Vieillot's name for the Frigate Bird.

[PELECANIDE, vol. xvii., p. 386.]

TACHYPHONUS. [PHEGLIDER, vol. x., p. 483; TANAGERS.]

TACITUS, CAIUS CORNELIUS, was probably born in the reign of Nero, but neither the place of his birth nor the exact date is known, nor is anything known of his parentage. There is no reason for supposing that he belonged to the illustrious patrician gens of the Cornelii. His ancestry extends to the time of Julius Caesar, and there is no reason to doubt the veracity of Tacitus in his statements, as it is sometimes stated. The few facts of his life are chiefly collected from his own works, and from the letters of his friend the younger Pliny. Tacitus was about the age of Pliny when he wrote his second annals. But the elder Pliny was born about A.D. 61 [Pliny the Young]. In the reign of Nero, which commenced A.D. 9.

A passage of the elder Pliny (Hist. Nat., vii., 16) speaks of a son of Cornelius Tacitus, the procurator of the emperor in Belgium. Cæsarius concludes that this Cornelius Tacitus was the historian; but as Pliny died in A.D. 79, it seems hardly probable that the passage can apply to him. It has been conjectured that the procurator was the father of the historian. Tacitus states that he owed his first promotion to Vespasian, and that he was indebted for other favours to his successors Titus and Domitian (Hist., i. 1). In the year A.D. 77, C. Julius Agricola, then consul, betrothed to him his daughter; and the marriage took place after the consulship of Agricola. Tacitus does not state what places he filled under Vespasian and Titus, but in the reign of Domitian he informs us that he assisted as one of the Quindecemviri at the celebration of the Ludi Seclares, which event took place in the fourteenth consulship of Domitian (A.D. 88). At that time he was also praetor (Ann., xi. 11).

He was not at Rome when his father-in-law Agricola died there (A.D. 93), in the reign of Domitian; but it is too much to affirm, as some have done, that he was an exile during the time of Domitian. It is stated, however, that he was at Rome in the year A.D. 88. A passage in his Life of Agricola (c. 45) rather leads to the inference that he was at Rome during many of the atrocities which Domitian perpetrated after the death of Agricola, though he had been absent from Rome for four years prior to Agricola's death. On the death of T. Verginius Rufus, in the reign of Nerva (A.D. 97), he was appointed Consul Suffectus, and Pliny enumerates it as the crowning event to the good fortune of Verginius that his panegyric was pronounced by the consul Cornelius Tacitus, the most eloquent of speakers.

Tacitus is recorded by his friend Pliny as one of the most eloquent orators of his age. He had already attained some distinction as an advocate when Pliny was commencing his career. In the reign of Nerva, Pliny and Tacitus were appointed by the senate (A.D. 99) to conduct the prosecution of Marius Priscus, who had been consul of Africa, and was charged with various flagrant crimes. On one occasion Tacitus replied to Sextus Libanius, who had spoken in defence of Priscus; his reply, says Pliny, was most eloquent, and marked by that dignity which characterized his style of speaking. (Pliny, Ep., ii. 11.)

The contemporaries of Tacitus were Quintilian, the two Plinys, Julius Florus, Maternus, M. Aper, and Vipsanius Messalla. He was on terms of the greatest intimacy with the younger Pliny, in whose extant collection of letters there are eleven epistles from Pliny to Tacitus.
In one of these letters (vi. 16) Pliny describes the circumstance of the death of his uncle, Pliny the Elder, and the letter was purposely written to supply Tacitus with facts for his historical works.

It is not known when Tacitus died, nor whether he left any children. The emperor Tacitus claimed the honour of being descended from him, but we have no means of judging of the accuracy of the emperor's pedigree; and Sidonius Apollinaris (Ep. iv., ad Poemenium) mentions that Tacitus was a member of the same family as Poemenius, a prefect of Gaul in the fifth century of our era.

The extant works of Tacitus are, 'The Life of Agricola,' 'The Treatise on the Germans,' 'Histories,' and 'Annals.' and the 'Dialogues of Orators.' The former is the only work of Tacitus, the life of which is comprehended in the first and second book of that of Caesar. None of his orations are preserved.

The 'Life of Agricola' is one of the earliest works of Tacitus, and must have been written after the death of Augustus (a.d. 30). The 'Proemium,' or Introduction to it, was placed between the 'Tragedy of Caesar,' and the whole work probably belongs to the first or second year of that emperor's reign.

As a specimen of biography it is much and justly admired. Like all the extant works of Tacitus, it is unnumbered with minute irrelevant matter; the life and portrait of Agricola are sketched in a bold and vigorous style, corresponding to the dignity of the subject. The biographer was the friend and son-in-law of Agricola, whom he loved and revered; but he impresses his readers with the value of the life and character of Agricola, his courage and his prudence, without ever becoming his panegyrist. The 'Life of Agricola' was not contained in the earliest editions of Tacitus.

Yet Tacitus was not so political in the earlier part of the first four books and a part of the fifth, and these comprehend little more than the events of one year, from which we may conclude that the whole work must have consisted of many books. Unfortunately the fifth book contains only the preface, and the preface which was inserted in the first edition of A.D. 121.

The 'Annals' comprehended the history of Rome from the death of Augustus to the death of Nero, a period of two and fifty years, which ended with the extinction of the Julian House in Nero. A part of the fifth book of the 'Annals' is lost, the seventh, eighth, ninth, tenth, the beginning of the eleventh, and the end of the sixteenth and last book are also lost. These lost portions comprehended the whole reign of Caligula, the first years of Claudius, and the two last years of Nero's reign. It is said that the preservation of the historical works of Tacitus is due to the emperor Vopiscus (Tacitus, 10), who caused them to be transcribed ten times every year, and copies to be placed in the hands of the historians. Others, however, particularly the 'Annals,' were neglected during the decline of the empire, and few copies of them were preserved. The first five books of the 'Annals' were not found till the beginning of the sixteenth century, when they were discovered in the Abbey of Corvey, in Westphalia, and published at Rome, in 1515, by Philip Beurardus.

The 'Germany' of Tacitus has been the subject of some discussion as to its historical value. The author does not inform us whether he drew his materials for the description of the usages of these barbarians, many of whom could only be known by hearsay even to the Roman traders and adventurers on the frontiers of the empire. The work contains a few facts or peculiarities of the times, and it must be assumed that the writer had at least the evidence of persons conversant with the German tribes on the frontiers; and there is nothing in the description of Tacitus which is not also found in the first of the annals, and particularly the 'Annals,' were neglected during the decline of the empire, and few copies of them were preserved. The first five books of the 'Annals' were not found till the beginning of the sixteenth century, when they were discovered in the Abbey of Corvey, in Westphalia, and published at Rome, in 1515, by Philip Beurardus.

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minal Cases"), while laying bare the inmost soul of a murderer, makes us shudder at the contemplation of enormities of which every man is capable. Tacitus had lived through them, and their value of the historical work of philosophers, his practical application, and his historical studies carried him through a period in which the mass were sunk in sensuality, and the really good and great had no consolation but in the consciousness of their own conduct. He had no philosophic guide to his task, and to no other philosophers, his practical morality was that of the Stoic school, the only school which in those degenerate times could sustain the sinking spirits of the Romans, and which oven understanding the circumstances of the wise Aurelius, the noblest man that ever possessed sovereign power. The religious opinions of Tacitus partook of the character of his age: he had no strong convictions, no settled belief of a moral government of the world. He denoted, indeed, a purely moral; they had no reference to a future existence. (Ann., iii. 18 ; vi. 22 .) In one of his earliest productions he hopes rather than expects that the souls of the departed may still live and be conscious of what is passing on earth. (Agric., 46.) But in his latest writings there are no traces that his hopes or his wishes had ever ripened into a belief.

The style of Tacitus, especially in his "Annals," is the apt expression of his thought: concise, vigorous, and dramatic. His literary style is a degree of denudation as is compatible with perspicuity; sometimes his meaning is obscured by his labour to be brief. His historical works are especially works of art, constructed on a fixed principle, and elaborated in obedience to it. He loves the majestic, and is always refining on his dramatic purpose. It is a fault that his art is too apparent, that his thoughts are sometimes imperfectly or obscurely expressed, that he affects an air of mystery, that his reflections on events are often an inexpressible part of them, and consequently the impressions which it is his object to produce can only be rectified by the rigorous scrutiny of a matured mind. Yet those who have made Tacitus a study generally and in admiring him even for some of his defects which may be corrected, also hold every word has its place and its meaning, and the contrast between the brevity of the expression and the fulness of the thought, as it marks the highest power of a writer, so it furnishes a matter for reflection to those who have attained a like intellectual maturity.

Tacitus must have had abundant sources of information, though he indicates them only occasionally. He mentions several of those historians who lived near his own time, as Vipsanius Messalla and Faluis Rusticus ; he also speaks of the memoirs of Agrippina and others. The Orations Principium, the Pasti, the Acts of the Senate, and the various legislative measures were also sources of which he had been, and is, undoubtedly, an intimate acquainted. The minute detail of events was often foreign to the purpose of Tacitus, and accordingly he is sometimes satisfied with giving the general effect or meaning of a thing without aiming at perfect accuracy. Thus we cannot always collect with certainty from Tacitus the provisions of the Senatus-consulta of which he speaks ; and for the purpose of any historical investigation of Roman legislation, his statements must sometimes be enlarged or corrected by reference to other sources, and particularly to the Digest.

The first edition of Tacitus, which is extremely rare, was

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printed at Venice, in 1470, by Vindelin de Spin : this edition contains only the last six books of the "Annals," the "Histories," the "Germany," and the "Dialogue." The subsequent edition, however, is, in a very large number of the later editions is that of Ernesti, by Oberlin, Leipzig, 1801, 2 vols. 8vo.: it contains the valuable notes and excursus of Lipsius, the best of all the commentators on Tacitus, and in his department one of the first of modern scholars. The latest edition is by Immanuel Bekker, Leipzig, 1821, 2 vols. 8vo. ; there is a Lexicon Tacitum, by Bötticher, Berlin, 1890, 8vo.

There are translations of Tacitus in Danish, Swedish, Dutch, German, Italian, Spanish, Portuguese, and English. The Italian translation of Danzi is considered to be a model of condensed and vigorous translation. A French writer considers that his own language is perhaps best capable of representing the thoughts of the eloquent and moral historian, in suggesting his precision, attaining his elegance, and aspiring to his energy

(Biog. Univ., art. "Tacite"); an opinion which is perhaps not true. D'Alembert translated various passages from Tacitus. The English version of Murphy, which first appeared in 1797, gives an impression of the original; it expresses the meaning of the original; as a work of art, being a translation of a work which is above all other historical works characterized by its art, it is contemptible. Gordon's version, which appeared before that of Murphy, is a harsh and rushed version; but it is tolerably faithful to the meaning of the original, and was probably useful in helping Murphy to it.

For further information on the editions and translations of Tacitus, and on works in illustration of him, see Hain's Repertorium; and Schweigger's Handbuch der Classicsen Bibliographie.

TACITIUS, MARCUS CLAUDIUS, a Roman emperor, was the successor of Aurelianus. After the interregnum of thirty-five years, in which the old邮箱 275, but with the most favourable assurances from all classes of his subjects. Tacitus immediately instituted some salutary reforms relating to the coinage and other matters. He restrained the luxury of the times by sumptuary laws, and was himself an example of the greatest temperance, modesty of deportment, and single-minded magnanimity. He gave up his whole private fortune to the state, and introduced a change in a disturbed and way of life. He was of very studious habits, and gave orders that the works of the historian Tacitus, from whom he claimed descent, should be preserved with the greatest care in the public libraries, and copies of them made for the year. He used his power with great forbearance, except perhaps in the punishment of those concerned in the murder of Aurelianus, whom he is said to have put to death without discriminating their several degrees of guilt. The frontiers of the empire were in a disturbed state, and Tacitus committed the chief command of the East to Probus, in whom he repose entire confidence. The Scythe, or Goths, pretending that they had been summoned by Aurelianus to aid him in his Persian war, made an irruption at this time from the Palus Macedos into Pontus and Cappadocia.

Tacitus proceeded thither in person with his brother Florianus, and having first tried conciliatory measures, compelled them to retire by force of arms. His reign, commenced with such fair prospects, was now prematurely and abruptly terminated. He had appointed Maximinus governor of Syria, who treated his subjects with such cruelty, that the magistrates of the towns in that province, sided by those yet surviving of the murderers of Aurelianus, conspired against him and killed him. Despair of his murder, led them to commit a greater crime, and they formed designs against the life of the Emperor, who fell a victim to their treason at Tyana in Cappadocia, after a reign of about eight months, in the spring of the year 276. According to one report, he died of disease, harassed by hunger, and at the age of forty-three. Zonius and Zonaras, that he was murdered by the conspirators, seems entitled to greater credit. After his death, his brother Florianus seized the empire, but was put to death two or three months afterwards. Gibbon attributes to Tacitus many of the measures produced at this time to revive the power of the senate. It is certain that he showed great deference to that body ; and when they refused to make his brother Florianus consul because the time of election had expired, he expressed himself pleased with their frankness. The coins of Tacitus record his victory over the Scytheans by the inscriptions
Victoria Gothi and Victoria Pontiae; see also Guerter, exc. ii, and for his Life—Vopiscus, in the ‘Historia Augustæ’; Zosimus; Zonaras; Aurelius Victor, De Vit. et Mor. Imperat. Roman.; Tillemont, Histoire des Empereurs, iii.; Gibbon, ii.

TACKING is an operation with the rudder and sails, by which, when a ship is proceeding in a course making any acute angle with the direction of the wind on one of her bows, her head may be turned towards the wind so that she may sail on a course making nearly the same angle with its direction on the other bow.

In order to accomplish this motion, the sails being braced, as at t, so as to allow the ship to have as much velocity as possible in her actual direction, the helm is turned a-lee, as it is called, when the force of the water on the rudder, together with the force of the wind on the mizen-sail, causes the ship gradually to turn her head towards the wind. By this motion the planes of the main and fore sails are brought in the direction of the wind, when they begin to shiver, and soon afterwards they are taken aback, or the wind presses them against their masts. In this state the mainsail is braced round to the opposite side of the ship, as at h, and the action of the wind on the foresail, while it arrests the forward motion of the ship, turns her head round from the direction of the wind and so as to bring the latter upon the other bow: the foresail is then braced rapidly round on the other tack, that is, parallel to the new position of the mainsail, as at nr., when it is immediately filled by the wind, and the ship proceeds in the new course; the action of the wind on the mizen sail, together with that of the water on the rudder, preventing her from falling too far from the direction which she is required to take.

TACQUET, ANDREW, a mathematician of some celebrity, who was born at Antwerp in 1611. He entered at an early age into the order of the Jesuits, and was one of the many members of that body who distinguished themselves by their works, which they composed for the advancement of the sciences. He held the post of professor of mathematics during fifteen years, and died December 23, 1660.

Tacquet published at Antwerp, in 1651, a work in 4to., in four books, on the sections of cylinders and on the figures formed by the revolutions of segments of circles; and to these books he added a fifth in 1659. In the year 1650 he published, in 8vo., ‘Elementa Geometricæ plane et solidi, quæ ab Academia Bruxellensi, et Academia Lugduno-Batavae, in the same year, ‘Arithmeticae Theoria et Praxis accuratissimè demonstrata.’ These two last works appear to have been for a long time in use in the schools of the Jesuits.

A collection of the principal works of Tacquet was published at Antwerp in 1669, in two folio volumes, under the title of ‘Opus Mathematica demonstrata et propagata a S. L. &c.’ Among these works are Astronomicæ libri octo; Geometricæ Practicae libri tres; Opticæ libri tres; Catoptrics libri tres; Architecturae Militari unus; Cylindricorum et Annularium libri quinque; et Dissertatio de Circulorum Volutionibus.

In the treatise on astronomy, the author, in conformity to the system of Ptolemy, considers that the earth is immovable at the centre of the universe; but it is thought that he adopted this supposition less from a conviction of its truth than through deference to the authority of Briccioli, whose work he follows, and through an unwillingness to admit the hypothesis of Copernicus on account of its contradiction to the letter of certain passages in the Scriptures. In the work on cylinders, &c. he determines the surfaces and volumes of bodies formed on cutting a cylinder by planes in different directions; and he investigates the surfaces and volumes formed by the revolutions of different assemblages of circles and of the conic sections about axes in given positions: the reasonings are conducted by geometrical processes agreeably to the methods then recently introduced by Cavalieri and Gregory of St. Vincent. In treating the theorems selected from Archimedes, Tacquet assumes, in order to diminish the length of the demonstrations, that regular polygons may be inscribed within and described about circles, till at length their areas and peripheries differ respectively from those of the circles by quantities less than the least that can be assigned: then, considering the polygons and circles as identical, he obtains the ratios of the peripheries of the circles and the equivalent for their areas: by assuming also that there may be described about a sphere a polyhedron whose surface shall differ from that of the sphere by a magnitude less than the least that can be assigned, he determines both the volume and the surfaces of the latter. Archimedes had demonstrated that the volume and superficial values of a cylinder and of an equilateral cone, when both are described about the sphere.

TACTICS (tactes) properly signifies the art of forming the troops of an army, or the ships of a fleet, in order of battle, and of making changes in the dispositions of either according as circumstances may require.

Under the word Strategy it has been shown that previously to the commencement of active warfare, it is necessary to occupy one fortified place or more near the frontiers of an enemy’s country for the purpose of placing there in security the magazines of an army, and of receiving support in the event of being obliged to retire. And as an army in quarters now generally occupies a considerable extent of country, it would evidently be advantageous to have a fortified place on each of its flanks, in order to prevent the enemy from getting to the rear without making a circuitous march of such extent that ample time would be allowed for counteracting the project. The fortresses occupied by an army constitute the base, and the roads by which it is to advance to the immediate seat of war are called lines of operation.

In Europe, an army while in the field can draw much of its support from the country which it occupies; therefore it does not always wholly depend upon its magazines for the means of subsistence; yet even in this part of the world the supplies of provision and forage which can be obtained in an enemy’s country are often provided without a regular communication with its depots is in danger of being reduced to the necessity of surrendering in order to avoid being starved. Such a disaster is still more likely to overtake an army when the means of support in itself, since there the military force of the country consists chiefly of swarms of light cavalry, who, avoiding regular engagements, hang continually upon the invaders, both preventing supplies from reaching and sapping off all parties who may be beyond the protection of the main body.

A single line of operations unless it be at all safe the enemy, entirely to attack the columns or convey on the road. Route at considerable distance troops moving on the other in the event of Lines of operation præcisely a base line, and rely the possession of the these are always on their marches and the proceeding from the other lines; and troopers if the enemy follow them, are more liable
routes lie on interior lines. Diverging, or, as they are called, eccentric lines, proceeding from any one point or more in a base may be considered as advantageous for other reasons by themselves, troops may be rapidly moved up to once to different points in an enemy's line; and if compelled to retreat from such points, they will gradually approach towards each other: they will thus be enabled to unite at some point in the rear, and thus the enemy, acting in the same manner as above, be observed however that such lines ought not to have a great degree of divergence, especially when there are few or no cross roads of communication, since then the columns in their advance may become so far separated as to be a danger of being cut off in detail; and the like objection is applicable to diverging, or eccentric, lines of retreat.

During the campaign in Russia, in 1812, the armies of Barclay de Tolly and of Pierre Brienne, retiring from Smolensk, met near by St. Peterburg and road a few miles to the other by that of Moscow: they became thus separated so far as to be unable to support each other, and, and the French emperor being aware of the circumstance, it is probable that both of them would have been annihilated. Fortunately for Russia, Barclay succeeded, by a long and hazardous march through cross roads, in rejoining his colleague. On the other hand, it must be observed that nearly parallel or converging, lines of operation in rear of an army are sometimes unserviceable for a retreat: the Prussians, after the battle of Jena, suffered a severe augmentation of their disasters by the two divisions of the army, which had been unconnected during the action, becoming immediately mixed in their retreat, so that a state of inextricable confusion ensued.

In the campaign of 1809, the British and Spanish armies were compelled to act on what are called double eccentric lines of operations: for Lord Wellington was on the line of the Tagus, having Lisbon for a base, while Venegas, with a Spanish army was employed in La Mancha; and there were besides the forces in Gallicia and Leon. The armies, being thus separated from each other, were quite unable to co-operate for one object, even had the Spanish generals and armies been capable of executing any combined operations.

The manner of reconnoitting ground, of selecting positions, and of performing the details of military manoeuvres, have been described under Reconnaissance, Military Positions, and Evolutions Military; and, in the present article, it is intended only to explain the principles of tactics with relation to the marches of armies, the general movements on a field of battle, and the conduct of a retreat.

Marches comprehend all the movements by which an army transports itself from one place to another: when the opening is a considerable distance from the enemy, they are called routes; and on such an occasion the object generally is to invade a country, to seek subsistence, to surprise the enemy, or force him to make counter movements, in executing which advantage is to be gained. Marches form the opening of a campaign, and in the enemy's sight, marches are made in order to attack some important position which he may occupy, or succour some post which he may threaten, or in order to fall back on the magazines of the army. The end of a campaign is an army marches to the quarters which it is to take up for the winter.

When an army already encamped in order of battle is to advance some distance from the ground directly in front of it, the march is said to be to the front; and if it is to proceed to ground on the right or left of the line, the movement is called a flank march. In the former case it would be advantageous if there were several roads nearly parallel to one another, and retreating to them troops of body of the army occupied; and it would even be proper, should there not already exist a sufficient number, to make such, by cutting through woods or walls, forming causeways over marshes, or digging subterranean streets. Should there be divided into several short columns, so as to be able with facility, if suddenly attacked, to deploy into line at any moment either during the march or on arriving in the new position, the intervals between the lines of route should therefore be, as nearly as possible, equal to the extent which the columns moving in those lines would occupy when formed in order of battle. The advanced guard, consisting both of infantry and cavalry, may march before the head of the centre column at the distance of about a mile; and these troops should be accompanied by the pontoons, and the sappers who are to remove the obstacles, or cut channels through which the French, when advanced into Russia, in 1812, marched in three great columns nearly abreast of each other: the central column proceeded along the main road; and the country being one vast plain, the other forces with their artillery moved over the ground on both sides.

On a flank march along nearly parallel roads, since the heads and rears of the columns are where the extremities of the wings of the army would be if in order of battle, the several columns, as far as possible, that the troops may readily move into their proper places in re-forming the line; and it is obvious that, in such marches, the divisions in each column should be as well closed together; for since the columns are separated by rivers, or by any other obstacles, the enemy might seize the opportunity to attack a division before it could be supported by the others.

The difficulty of returning rapidly to the order of battle after an attack, is the reason that flank marches in the presence of an enemy are dangerous, particularly when the ground offers no impediment to his approach: they however become necessary when a position is to be taken up, so as to ensure either safety or advantage in enemy's artillery, if they may be executed with safety, the columns should be protected in flank by a corps appointed for the purpose. In general an effort is made, by false demonstrations, to deceive the enemy, for a time at least, respecting such movements: they may consist in opening directions through woods or enclosures, in laying bridges over streams, in sending provisions and stores, and even bodies of troops to various points; and, while the enemy is in a state of uncertainty concerning the object of the demonstrations, the columns secretly commence their march: care however is to be taken that detachments, when sent out as feints, do not proceed so far from the army as to be cut off, or compelled to retire with great loss.

In the usual order of march the artillery should be formed in divisions corresponding to those of the troops, in order that each column may have a portion attached to it, and ready to act with it in the event of being obliged suddenly to come to action independently of the rest of the army. A few pieces of artillery generally accompany the advanced-guard in order to protect the deployment and commence the action; and a division composed of the heaviest pieces may move with the cavalry for its support. During the march, the place of the artillery is in rear of the column to which it belongs, that it may not impede the movement of the troops; that of the reserve artillery, for which another establishment is intended, may readily move up to the position in which it is to be employed. If a point of attack has been previously decided on—if, for example, it is intended to commence an engagement by assailing a village or an intrenchment—of this the artillery must be informed. In such cases, the columns destined for that purpose; and if the army while making a flank-march is likely to be attacked on the road, some artillery proceeds at the head of each division to the troops. Should a march in such circumstances take place, the troops must form as quickly as possible, and the artillery must be placed where it may serve to repel the assailants by its fire.

If an extensive movement is to be made in order to arrive at the flank of the enemy, it is necessary to be careful that the latter may not, by short routes, attack the army on the march. This manoeuvre was successfully performed by the Prussians at Liegnitz in 1750: the king, not regarding the advantages by which the Austrians are a great danger of being overwhelmed, on learning that the corps of General Loudon was moving to turn his left and fall on his rear, while other troops were to attack him in front, and suddenly some of the troops and artillery to occupy the attention of Marshal Daun in front, and defeat Loudon on his march: by this action he opened a communication with Breslau, and caused the siege of Schwednit to be raised.

In all marches the breadth of a column must depend upon that of the road, and space should be afforded for the officers and orderlies to pass by the side of the troops without inconvenience: care should be taken, when any
change is made in the breadth of a column previously to entering a defile, that the formations be made without allowing them to fall into confusion.

To force a defile which is occupied by an enemy possessing artillery, and covered by epaulettes, is an undertaking which is likely to be attended with some loss; but if the enemy is confronted: it was very often employed by the Greeks, Romans, and during the middle ages; but it is now seldom adopted, since the weaker army is in danger of being outflanked; and should any part of it be driven back, the enemy may act with effect against the enemy's position, or against the posts which he may occupy. These detachments must be followed by reserve troops, by whom they may be strengthened, or on whom they may retire if repelled, and they should be posted at every point by which the defile, with its parallel or traverse passes, if such there be, is flanked; when the main body of the army may dispose itself in the position which shall appear most favourable for maintaining possession of the ground while the enemy remains in the neighbourhood: strong detachments must also be placed in situations which may command every approach to the flanks of the defile.

The operations to be performed at the commencement of an offensive war will depend in part on the form of the frontier: if this be convex towards the enemy, it may be considered as favourable for the operations, since the inclination of the enemy's line, and the incidents of the country, are favourable for making fatiguing movements in order to arrive at the points which are to be defended. In the event of having penetrated into the enemy's country, some strong posts should be secured, in order that they may serve to protect the succeeding operations. Fortified places are usually on rivers, or in situations from whence cross-roads diverge into the country; and the possession of even one such place would be advantageous, as a depot for artillery and stores, while the near or distant roads would facilitate the conveyance of supplies to the army.

On the other hand, in order to defend or conquer a country, an army should be posted so that by short movements it may reach the enemy; and it must be understood that, in acting on the defensive, the corps of troops should not be stationed at great distances from each other, in the expectation of being able to defend every point which may be menacing. The opening of the campaign in 1809, on the advance of the Austrians in great force towards the frontiers of France; when General Berthier so separated the divisions of the French army, that all of them might have been separately defended, shows how little the principle of the Archduke Charles had been more rapid than they were.

When two armies are in the neighbourhood of each other, an engagement, either general or partial, may take place; the latter usually consists in an attack on one wing, or on some advanced part of the enemy's line, in order, by driving it back, to obtain a more advantageous position, or to secure some line of communication. A general action may become necessary when an invasion of a country is to be prevented, when a besieged fortress is to be relieved, when the position occupied is to be defended, or when that which is occupied by the enemy so far obstructs the communications as to deprive the army of water or provisions; and when the enemy is so disposed as to refuse the position of the enemy is disadvantageous, if the divisions of his army are ill supported, or if his force is weakened, either from some part being badly covered, or from considerable detachments having been made.

An army drawn up for parade is usually disposed in two lines, with the infantry in the centre of each, and the cavalry on the wings; but this is far from being the case on service, since the nature of the ground will frequently render a contrary disposition necessary; in some parts of the field the troops may be in a single line, in other parts in two, or even in three lines.

The order of battle immediately previous to an engagement, and the plan of the ground, or the facility which the ground may afford for disposing and moving the troops, that it is scarcely possible to assign any rule for the formation; yet it is usual among military writers to place the reserve infantry at the dispositions of an army under two kinds, which are designated the paréille and the oblique order. The first comprehends all dispositions in which the troops of both armies may be engaged at once along the whole of their fronts; the second is employed by the first, if the enemy, in the depth of the country, the defile, or, being compelled to retire. The battle would therefore be lost; and, being closely pursued, the defeated army incurs the risk of being entirely ruined. At the battle of Talavera, July, 1809, the two armies were drawn up in parallel order, and at the time of the battle French at the same time on the centre and on both wings of the allies.

The oblique order of battle may be said to have been employed by the ancients when it was intended to break the enemy's line: on such occasions the phalanx was drawn up in the form of a wedge, and it advanced with an angle in front against the centre of the line. At the battle of Arbela, the army of Alexander attacked only the right wing of the Persians; and at the battle of Cynoscephalae, the consul Flaminius, ordering one of his wings to remain on the ground which it then occupied, advanced with the other against the army of Philip. (Polyb., ex. 3, lib. 17.) But the protection afforded by the rear of the army was supposed to be at the centre of the curve, may then march on roads nearly in the direction of the radii towards the points of attack, while the enemy will be compelled to act on the periphery of the curve by long lines of communications. Hence the French, which are now supposed to be at the centre of the curve, may then march on roads nearly in the direction of the radii towards the points of attack, while the enemy will be compelled to act on the periphery of the curve by long lines of communications. Hence the French...

On sound military principles by Frederick III. of Prussia. It does not always consist in drawing up an army in a straight line, which, if produced, would meet the line of the enemy; for this, on account of the inequalities and obstacles of the country, would be impracticable, and the two wings of an army always placed at unequal distances from each other, though this frequency of the case. The principle of the oblique order consists in such a disposition of the troops as may enable a portion of the army to engage at some one point in the enemy's line, while the rest, protected by the obstacles of the ground, is stationed so as to be able to support the troops engaged, or prevent the enemy at other points of his line from attacking those troops in flank; and a great commander will always manœuvre so that his army, even though inferior on the whole to that of the enemy, may be superior in strength at the point of attack.

The attack is generally directed against one of the enemy's wings in the hope of being able to turn it, that is, to get beyond its extremity, or in its rear, and thus to cut off its retreat or intercept its supplies; but if the enemy's wings are well placed, or by intercepted communications, or by strong reserves being posted, if at the same time the centre has been weakened by troops having been drawn away, or by those which form it being widely disseminated, the attack may be advantageously made against the centre of the line. January, 1808, the British and French armies were in oblique order, the right of the former being near the left of the latter; while the opposite extremities were, by the nature of the ground, kept at a considerable distance from each other. The French made a charge with two strong columns, one of which advanced towards the British centre, and the other attempted to turn its right; in order to take this last column in flank, a part of the British army was placed obliquely to the line, and these two forces, together with that of the reserve, which was moved up to support the right wing, prevented the success of the manœuvre. At the battle of Eckmühl (1809), Napoleon with his right wing attacked the left of the enemy's line; when he had gained the heights in that part of the position, after having suffered immense loss in storming a redoubt which protected them, and which was gallantly defended by the élite of the Russian infantry.

Whatever be the order of battle, a strong reserve of troops is necessary at the first line was destroyed, was the means of the victory
being gained; and at the battle near Bayonne, December, 1813, two British regiments having been improperly withdrawn from an important position, that position was in danger of being lost, when General Hill brought up the reserve and maintained the action. Strong reserves are particularly necessary when armies engage on a plain, as then the whole of a line may be forced into action, and in the event of being defeated, its ruin would be inevitable without the support of a numerous body of troops.

When cavalry commenced an action, its charge should be preceded by a fire of horse-artillery placed on one of its wings. The fire of that artillery should at first be directed against the part of the enemy which is at a distance from the point to be attacked; and if the latter point should be weakened by troops being withdrawn from it to strengthen that point against which the fire is directed, the main body and cavalry immediately move rapidly forward; the charmed horses, rounds of grape-shot, retire, and the cavalry is left to execute its charge. Should the artillery become mixed with the combatants, it would be in danger of being taken by the enemy, whereas being kept in reserve, it may after the charge either join in the pursuit or protect the retreat.

Infantry generally commences an attack by a fire of light guns. These are accompanied by a part of the artillery, which joins in the first line of the remaining reserve. If the skirmishers retire in order to allow the first line of the army to engage the enemy, the reserve artillery is brought up with that line, and it disposes itself by the flank, and is kept in action till it goes to one of the wings. Should the enemy's line become disordered, the horse-artillery gallops up to within range of grape-shot, and completes the victory.

The stations of artillery in position should if possible be such that the fire of the guns may converge towards some battery of the enemy, in which case the fire of such battery against those guns is necessarily divergent. In general when an army acts on the offensive, the lines of fire from batteries in position should form nearly right angles with the front of the position, in order that the attacking columns may have room to form in the intervals between those lines of fire: but if the enemy be the assailant, the lines of fire may form acute angles with the position, in order that he may be thereby annoyed when nearly in contact with the troops; the fire of the artillery being directed against the points where the enemy's troops are in masses, as against the heads and flanks of the columns of attack; the guns should not however be placed in position till they are wanted, in order that they may be as little as possible exposed to the fire of the enemy; and if any battery is placed to a heavy cannonade, another should be placed in a position where its fire may cross that of the first battery on the ground occupied by the enemy's guns. When placed on elevated ground, the guns in a battery should be able to defend all the slope of the height up to them; and when that is not possible without bringing them near the brow as to be exposed to the view of the enemy, other guns should be placed where their fire may flank the ascending ground.

Artillery consisting of 8-pounder guns are found most convenient for the batteries which are placed with the troops: such guns are capable of serving to defend the position, and they may be employed to destroy walls, displace abatis, or ruin field intrenchments. Howitzers are also used in the field for the purpose of throwing shells into fortifications, or among troops, protected by abatis, hedges, hollow ways, &c., where the shot from gun-batteries could not take effect. Horse-artillery should be kept with the reserve, and be ready to advance wherever it may be most useful or necessary in support of the line which is likely to be forced, or to gain the flanks or rear of the enemy; and when it is required to get possession of a position before the enemy can arrive at it, the horse-artillery, on account of the rapidity of its motion, may be employed for the purpose.

The batteries by which an army is protected in its position constitute a sort of bastions, being usually placed a little in advance of the infantry of the line. If the army receives the attack of the enemy's cavalry, they commence the action by a cannonade while the enemy is at a distance; and if the army acts on the offensive, the artillery supports the columns of attack. It is usual, when guns are fired in position, to direct them so that the shot may strike the ground in front of the enemy's line, and afterwards by rebounding make a series of grazes among his troops. When the ground is hard and even, these ricochets are very destructive; but if soft, or much broken by inequalities, the shot plunges in the ground and does comparatively little execution.

The proportions for the quantity of artillery in an army are one gun for every 500 men (infantry), and one gun of the horse-artillery for every 250 men (cavalry). Armies, whether on the offensive or defensive, are generally kept in columns till the proper moment for deploying has arrived; and for this disposition both parties are enabled to conceal their projects from each other till one of them has determined to commence the action, and each is in a condition to make such movements as may be necessary in order to give him advantage over his opponent. The Spanish General Cuesta was blamed for having, at the battle of Medellin (1809), in which he was defeated, advanced towards the French army in one weak line three miles long; while keeping the troops in columns he might have enabled them between the enemy's divisions, and thus, by separating them from each other, have destroyed them in detail. If a position is such that the army occupying it is exposed at several points to be attacked, those points should be supplied by small bodies of troops, the bulk of the army being kept in columns ready to march to any point where their services may be required. Thus the enemy will be embarrassed from the impossibility of determining the force of the army at any one point; and his only chance of success will lie in the quickness of his movements. The circumstances which may determine a general to attack a position at any particular point, are the appearance of that point being weak on account of troops or artillery being withdrawn; from the ground being there more easy of access than elsewhere, or from its capabilities of affording cover to troops in their advance.

If an army, as AB, in position on level ground, is to be attacked on its left wing, the army setting against it is usually placed an echelon, as at M, N, P, Q, each division consisting of a battalion or a brigade; and this formation may be accomplished by moving up the different columns, as at M', N', P', Q', to the places which, when deployed, are to occupy during the engagement. It would be advantageous however that the heads of the columns should remain till the moment of deployment in a line parallel to that of the enemy, in order to keep the latter as long as possible in suspense respecting the real point of attack. A favourable moment is then chosen for bringing the greatest mass, as M', to the wing at B, which is supposed to be the weakest part of the line, but it should be observed that this intention will succeed only when the different columns can be moved to their stations with great rapidity; for if the enemy has time to perceive the manoeuvre, he will not fail to take measures to counteract it. The echelon must always be so near one another as to allow them to be mutually supported, yet not so near to the enemy as to be in danger of being forced into action. In order to explain the process of turning an enemy's position, let it be supposed that the left wing B of his line is in a plain, and not protected by woods; consequently it may be turned, while the right wing A is covered by woods. Strong columns are formed
at M, in order to perform the manoeuvre of turning the flank B. The divisions at N and P constitute the centre, and may be advanced to line so as to be refused to the enemy; while Q may consist of a small division extended along the skirts of the wood merely to keep the enemy in check.

Should the enemy reinforce his left B, by drawing troops from the centre, the musquet fire and smoke would this circumstance become known after the troops have set out on their march towards B, the infantry of the column M then change their route and proceed towards N and P, concealing their advance by making a circuitous route and hollow ways, if such there be, while the cavalry, supported by some infantry in a village, as at I, move towards M as before, in order to deceive the enemy. The central columns P and N then move towards their left, and unite with the troops Q to attack the wing A. Thus the dispersed position of the army is completely changed; and if the enemy is thenceforth taken unawares, the enemy might not have time to reinforce the wing A before it would be turned. If the troops in the wing II were to advance to attack the central columns at P and N, and these were to retire, those troops would be unable to produce any effect, as it would be necessary to recall them in a short time on account of the danger then threatening the right wing.

This is nearly what took place at the battle of Leuthen (1757), when the king of Prussia advancing against the Austrian army, made demonstrations as if he would attack their right wing. Marshal Daun, though for a time he supposed it to be the case, yet did not trust his reserves to strengthen that wing: the king observing this, proceeded immediately to execute an oblique attack; for which purpose his columns moved rapidly to the right and deployed on the left wing of the Austrians: this wing gave way, and the right wing wheeled up to attack the Prussians left, the two armies were brought into parallel positions. These movements produced in the Austrian line disorder and openings by which the Prussian cavalry penetrated and took possession of the village of Leuthen; the Austrians rallied twice afterwards, but they were finally obliged to retire. At the battle of Albuera (1811) the French general at first moved his columns as if he intended to attack the left of the allies, but soon causing them to change the direction of their march, he rapidly placed nearly two-thirds of his army in order of battle perpendicular to the right of the British line. By this movement the allies were obliged to change their front, and, as this was done under a heavy fire, the enemy was upon them before they had time to complete the new formation.

When an army, in the position AB, is attacked on one wing as B, by the corps M, and is in danger of being turned as AB, the army N may be made secure by the manoeuvre by throwing back that wing in a direction BC, parallel to that of the attacking corps M: this is called the army en pente: the angle B is however weak, for the troops in BC by falling back may become crowded and disordered; AB may become exposed to a raking fire from M, and BC to a fire from troops at N, which would make it impossible for M ever to turn the flank BC without making a circuitous movement, by which it may be separated from the rest of its line: and if the army AB is strong enough, it may form a line parallel to BC and thus bring upon the enemy a parallel order would be restored, and the wing A might even be made to turn the left, Q, of its opponent: this should of course be attempted, as the return to a parallel order of battle leads to the useful result. In order to effect this the enemy BC should retire gradually, while the brigades in AB wheel back, in order to keep in connection with it; at the same time the brigades at A wheel to their front so as to form the new line A'C, in a direction oblique to that of Q, P, N.

An attack on the left wing of a line is often made by a strong division drawn up in one column for the purpose of forcing its way through the line at some point where it appears to be weak, and thus compelling the different corps to retire that they may not be separately over thrown. The French then, it is said, successfully carried on their plan, the emperor being in such a condition as to desire by all means, by this success made with so much success by Napoleon against the Continental armies, but which failed when attempted against the British troops both in Spain and at Waterloo.

It is adopted in order to keep an enemy behind retrenchments, in which case the troops move as much as possible towards the salient angles of the work in order to avoid the direct fire; it is also necessary when the ground only permits the troops to advance on a narrow front, as it is the case when an enemy's position have obstructions in its front, it must necessarily be attacked in columns if at all. The columns should be connected with each other by bodies of light troops, and the attack should be made with a view of separating a wing of the enemy from his main body.

The attack in column possesses some advantages over one made by troops deployed in line while the men remain steady in the column; for the enemy is intimidated by the sight of a vast body coming against him, while the assailants feel confidence from their union.

A rapid succession of efforts directed against troops in a slender line will also, in general, succeed in breaking their defence, and in several circumstances, in counterbalancing than counterbalance these advantages: during the advance over uneven ground the men lose their ranks and fall into confusion; the flanking fire of the enemy's artillery makes great havoc among the crowded masses, and the columns can only oppose this fire by an irregular fire from its sides; disorder then ensues, the commands of the officers are no longer regarded, and an attempt to deploy for the purpose of making an attack in line only completes the disorganization. An wise, so that their fire, indeed, scarcely succeed unless it were preceded by a heavy fire of artillery: this will put the enemy's line in disorder; and in the event of forcing it, the column may then be deployed in order to secure its advantages.

If a line, nearly equal in strength to that of the opponent, on being attacked in column, were to stand firmly, it is probable that the attack would fail; and even if the line were penetrated, the troops, by forming themselves in hollow squares, disposed chevron-wise, was wise, so that their fire, indeed, scarcely succeed unless it were preceded by a heavy fire of artillery: this will put the enemy's line in disorder; and in the event of forcing it, the column may then be deployed in order to secure its advantages.

The attack of the French at the battle of Wagram had however completely succeeded when the Austrians, on the precise spot at which Napoleon would cross the Danube, had very widely dispersed their troops; the centre of their line was particularly weak, and against this part the French emperor determined to direct a dense column; this was composed of the reserves of the army and the charge was preceded by a heavy cannonade which still further dispersed the Austrian troops. The army, being thus broken, was compelled to retreat. At the battle of Talavera (1809) the French in strong numbers attacked the British line; the latter was drawn up three deep, and its fire of musketry and artillery directed against the heads and flanks of the columns, aided by charges of cavalry, drove it back, and the enemy was so completely dispersed that the result made by the Guards was the cause of much disorder in the centre, and the enemy returning to the charge, that part of the line was completely broken; but fresh troops...
having orderd up to the spot, their fire kept the enemy in check till the disordered troops rallied, and the artillery continued to play on the ranks of the enemy’s columns, the latter at length gave way.

The success of an action is often promoted by sending out a detachment with directions to fall on the flanks or rear of the enemy during the sudden appearance of a body of troops in such a situation cannot fail to produce embarrassment in the army which is attacked, and to diminish the energy of its operations towards the front. On the other hand there is some danger in the employment of detached forces, as an arm command is seldom possible to afford them due support; and therefore they may be cut off by the enemy. The distance which the detachment has to march, together with the state of the road in which it must advance, must be calculated with precision, in order that it may be at the appointed post at a seasonable moment, and such determinations are very uncertain, particularly if the corps has to make a great circuit. It almost always happens that the detachment arrives too late for the accomplishment of the object; and this was the case with a detachment sent by the king of Prussia during the action at Torgau (1760), with a view of turning the left of the Austrians and cutting off their retreat.

Detachments are however constantly sent out to protect the parties reconnoitering a country, to guard a convoy, or to support a foraging party: in these cases its object is less to fight than to cover a retreat; therefore the troops assigned to the operation are in protection, and are not held when the enemy appears in superior force. During the war in Spain (1813), Colonel (Sir Frederick) Adam having been detached to occupy a post at Ordal, ten miles in advance of the army under the command of General Marmont, in Flanders, was suddenly attacked by the French army, and his troops dispersed: this misfortune is ascribed to neglect in not having placed outposts, by which warning might be obtained of the enemy’s approach.

An army which gains an advantage over its adversary is always more or less desirous of the action, and it is necessary that it should endeavour to recover its order preparatory to receiving the second line of the enemy, should the latter advance to renew the combat. On the enemy retiring, the first line of the victorious army advances, and then the second line follows it in order to support it, sending, if necessary, battalions or squadrons to replace such as have been much disordered during the action. In the event of the second line, or reserve, of the enemy being defeated, since then there is no apprehension that the action will be continued, companies of troops may be detached in pursuit of the retreating army; but even this advantage should be taken in the support of the main body, and particularly to prevent the troops from dispersing for the purpose of plundering the country. The advance of the whole army in pursuit should continue so long only as it can be conducted with order, otherwise the strength of the enemy may cause it to retreat, if his troops should rally in a good position. If disorder should take place among the pursuers, the latter should be made to fall back on the reserves: the pursuit of a retreating army can, indeed, be seldom continued beyond the first elevated ground at which the latter may arrive; since, however little discipline it may preserve, it may there rally and return to the order of battle. The consequences of the actions at Jena and Waterloo are exceptional cases in which the equalizer was placed in those places too completely disorganised to allow them to make any attempt to rally.

When the success of an action begins to be doubtful, and it is apprehended that the army must retreat, some of the heaviest artillery should be drawn off to a good position on heights, or behind streams or hollow ways, while the lighter artillery remains engaged: the first line of the defeated troops is then made to pass through the intervals of the reserve, which forms the latter centre of the action. The first line should remain in order of battle in rear of the second, till the latter is enabled to retire; and this alternate retreat of the lines should be continued till the army can be thrown into columns of march, when the rear of the second column is formed by the first line of the troops. In general the retreat should be made in one body, as thus it can more easily protect itself against the enemy in pursuit: if however the centre is broken, the army may be obliged to retire by different and even by diverging routes; and provided there are in the rear strong posts by which it may be protected, the risk of being cut off during such a retreat is small.

When there are narrow defiles in rear of the field of battle, the retreat through them becomes extremely dangerous. The columns should be dispersed, and the detachment of men in small parties, which may be protected, reduce the risk of being cut off. In other cases the columns should be compact, and, by a sudden change of front, the enemy may be kept in the middle of the defile through; and if they are already occupied by the enemy’s detachments, the retreating army may be annihilated or compelled to surrender. It has been observed that the situation of the British army at Waterloo would have been very critical as regards the retreat in its rear if there was only one road by which it could have retired. In order to pass a defile in safety, it ought to be previously occupied by troops: artillery and a reserve of men should also be stationed so as to defend the approaches on the advance of the enemy towards them.

If, when not in action, an army is to retreat from a position which it occupies, the movement is usually concealed from the knowledge of the enemy, and, for this purpose, it frequently takes place at night. On such occasions the outposts remain at their stations as long as possible; and fires are left burning on the ground, as if the army were still in the position: after it is dark the main body moves off, and the rest of the troops follow by degrees.

The approach of winter, and the necessity of taking repose after the fatigues of a campaign, render it necessary for armies, whether on the defensive or otherwise, to prolong their stay on the ground, and the follow of inaction. These positions, called winter-quarters, should be chosen by the commander of the army on the offensive, so that he may be able to preserve the ground which he has acquired, and render it secure against the enemy, in order to be secure against the attacks of the enemy. The principles by which a choice of quarters is determined are the same as those which regulate the occupation of ground for a field of battle. The quarters should be covered in front and on the flanks by rivers, or natural impediments to the approach of an enemy, or by forts constructed for defence.

A great extent of ground in front is therefore disadvantageous, as it may be easily guarded, and liable to be surprised, and the troops will be too much disseminated. If it is traversed by good roads perpendicular to its front, it is also disadvantageous, as the enemy may then easily march into the quarters.

Several battalions of infantry and squadrons of cavalry are quartered in villages along the front of the position; the whole or a division of a company or of a squadron at each place: these posts may be strengthened by redoubts, abatis, and other impediments; the line of retreat is cut off, to defend roads by which the enemy may approach, and bridges over the streams should be destroyed. The troops in each of these stations furnish the men necessary to constitute the advanced posts of the chain. A stronger or weaker station is sufficient; the purpose of the chain, and from these are sent such bodies of troops as may be requisite to support those in their front. The great body of the troops ought to be near a central point of the position, in order that succours sent from that body may easily reach any part of the theatre.

When an army is in quarters, there are established alarm-posts, at which the troops should be appointed to assemble. These are frequently in the vicinity of a castle, or other strong places: the barracks are usually all have assembled; but they should be in commanding situations, that, in the event of the enemy attempting a surprise, his movements may be easily seen. Each division, or corps of the army, should have its own alarm-post, and there should be, besides, the general place of rendezvous for the whole army: the latter place should be so situated that all the divisions may be drawn up there before the enemy could arrive at it, and it should be protected by the town or castle of which it may contain the provisions for the support of the troops.

A system of signals, for day or night, is determined on, by which intelligence may be conveyed to all the different posts, of the approach of the enemy. Should an army be ordered to march, the disposition of the columns of troops which are appointed to support that post take arms, attach the horses to the artillery, and prepare to march immediately to the point of danger; but the judgment of
the commander, and the information which he may receive from spies or deserters, must enable him to form an opinion whether a demonstration made by the enemy is true or false.

(Bulow, Esprit du Systeme de Guerre Moderne, 1801; Guibert, Questions finissant sur le Traité des Grands Opérations Militaires, 1811, with the continuation; Rogmat, Considérations sur l’Art de la Guerre, 1817; Lallemand, Traité des Opérations Secondaires de la Guerre, 1825.)

Naval Tactics. This branch of the art of war is in some respects similar to that by which the operations of armies on land are regulated: the 'orders' preserved by ships in sailing correspond to those of a land march on a plain, and the orders of attack in both services may alike be: (1) parallel or (2) oblique.

The antients, previously to the commencement of a naval action, drew up the ships in each fleet abreast of each other, and in that order one of the fleets moved on, or waited for the attack: for each ship being propelled by oars, and armed with a beak of iron or brass projecting before the bows, efforts were generally made to direct it so as by an oblique impulse to destroy the oars on one side of a ship of the enemy, and thus render it unmanageable, or so as to sink the beak to the side, and thus pierce the ship; and hence, in the antient manœuvres, each commander always endeavoured to keep the prow of his ship presented to the ship which was opposed to him.

But since the employment of gunpowder in naval warfare, each ship in two hostilities is manœuvred, as to bring one of its sides to bear against the bows or against a side of its opponent, in order that it may have the power of pouring into the latter the greatest quantity of fire; and since it is the object of both commanders to avoid being raped, a general action can take place only when the hostile fleets are drawn up in two lines parallel to each other, the heels of the ships in each being in the direction of the line. In the treatise of Père L’Hoste on naval evolutions, this mode of engaging is said to have been first employed at the battle of Trafalgar (1805); when James II., then duke of York, commanded the English fleet.

The order of sailing for a fleet should obviously be such that the several ships may be as near together as possible, both for the sake of mutual support, and that the signals which may be made by the admiral may be distinctly seen: it depends also necessarily on the order of battle, since it is of importance that the fleet should be enabled, with the utmost facility, to pass from either of these states to the other.

In naval tactics distinguish five different orders of sailing, the wind continuing to blow in one direction, and the heels of the ships remaining constantly parallel to one another; in other words, all the ships steering the same course. The first order is that in which the ships are abreast of each other in a line perpendicular to the direction of the wind; and the second is that in which the ships are arranged so that a line joining all their masts is oblique to that direction; but in this order the line may have two different positions with respect to the wind, for each ship may be on the starboard (the right hand) side, or on the larboard (left hand) side of that which is leeward of it. As in either of these two dispositions each ship in the line has that which is next to it on one side, opposite to one of its bows, and that which is next to it on the other side, opposite one of its quarters, this order of sailing is frequently called the *bous and quarter* line. In the first and second orders, if the ships are numerous, the line is inconveniently extended.

The third order is that in which all the sails being close-hauled, the ships are formed in two lines making with each other an angle of about 12 points, or 135°; the admiral’s ship being in the centre.

N.B. By the expression close-hauled is to be understood such a disposition of the sails that the ship may advance as nearly as possible towards the part of the horizon from whence the wind blows; and that this disposition of the wind makes then, on the side next to the ship’s head, an angle of about 6 points, or 67° 30’, with a vertical plane passing through the keel; and, on the side next to the ship’s stern, an angle of about 2 points, or 22° 30’ with the parallel of the sail.

The fourth order is in that which the ships, steering with the wind on one and the same quarter, are formed in several lines, divisions, or squadrons, and as much concentrated as possible. The ships of the commanders are ahead of the several divisions, and a line joining the masts of all the ships in each is supposed to be in the direction of the wind. This order is very convenient for a convoy, but it presents great difficulties to the formation of the line of battle. In this order, the fleet, if not very numerous, is divided into three squadrons, the ships of which sail in as many parallel lines: if numerous,
sively haul their wind and steer in the proposed direction; and when the admiral's ship has hauled her wind, the sternmost or windward ships do the same, and each proceeds in a direction parallel to that of the other ships. The fourth and fifth orders of sailing are formed by the leading ships of the different divisions getting and keeping their position, or in bow-and-quarter position, at the prescribed distances; and then the ships of the respective squadrons taking their places in each other's wakes.

In the orders of sailing, the distance of one ship from another, in line, should be such that any danger of running foul of each other may be avoided: in general that distance may be considered as equal to two or three cables' length (each = 120 fathoms). And, with respect to the distances between the several lines in the fifth order of sailing, it has been determined, the ships being close-hauled, by supposing that a line joining the headmost ship of one of the leeward divisions, and the sternmost ship of the next division to windward, should be at right angles to the direction of the wind; or that the angle which such line makes with each division should be equal to 2 points, or 22° 30'. In general this interval may be considered as equal to six or nine cables' length; and it is of importance that the distances prescribed by the admiral of the fleet should be strictly preserved.

In order that the commander of any one ship may readily ascertian and preserve his relative position in a fleet when in order of sailing, the ingenious device called the naval square, which was invented by Per L'Hoste, may be employed. It consists in tracing upon the quarter-deck a great square ABCD (diagrams Nos. 2 and 3), having two sides, AD and BC, parallel to the ship's length; the diagonals AC and BD intersecting each other in E, and the line EES being drawn vertically over the ship's keel; also the point H being towards the head of the ship. Now, if a ship were sailing in the direction SH, close-hauled on the starboard tack, as in the cut No. 2, so that BD coincides with the plane of the sail, and VE (bisecting the angle HEC) with the direction in which the wind is blowing; then, after having tacked and become close-hauled upon the larboard tack, since the directions of the vertical planes passing through the keel and sail make angles with the direction of the wind equal to those which they made before tacking, the line SH, that is, the line on which the ship will be sailing, will coincide with, or be parallel to, the position of EC in the diagram. In like manner, if a ship be sailing in the direction SH, close-hauled on the larboard tack, so that AC coincides with the plane of the sail, and VE with the direction in which the wind is blowing; then, after having tacked and become close-hauled on the starboard tack, the line SH on which the ship will be sailing will coincide with or be parallel to the position of ED in the diagram.

Hence, if a fleet be in three parallel divisions, the ships sailing abreast of each other, those in each line will be in the direction SH, and the corresponding ships in the different divisions will be in the directions AH or DC. If the fleet sails close-hauled, and, for example, on a starboard tack as in No. 2, the ships in each line will be in a direction coincident with or parallel to SH, and the corresponding ships in the several lines will be in a direction coincident with or parallel to WE, which is that of the wind. Again, if the fleet is in three divisions, and the ships are sailing in parallel directions not coinciding with those of the divisions; if, for example, the ships should be sailing on the larboard-line of bearing, while close-hauled on the starboard tack, as in the subjoined diagram, the ships in each line will be in the direction of one of the diagonals of the square; and the corresponding ships in the different divisions will be in that of the other.

The order of battle consists in the ships being drawn up in each other's wake, or in one right line with which the directions of all their keels coincide; they are usually about 50 fathoms from one another, and are nearly close-hauled. The frigates, store-ships, &c. are in lines parallel to that of the line-of-battle ships, and on the side opposite the enemy. A line of ships close-hauled is particularly advantageous as an order of battle both for a fleet to windward, and also for that which is to leeward of its opponent. The order of battle may be adopted in any other state, the enemy might, by manœuvring, gain the weather-gage, or he might, by being able to approach as near as lie pleased, compel the windward fleet to come to an action. And a leeward fleet which is close-hauled is always prepared either to take advantage of any change of wind in its favour, or to avoid an action. In a close-hauled line also, the sails are disposed so that the ships remain nearly stationary during the action; on which account the line is steadily preserved, and any ship on becoming disabled can be easily replaced by one of those which are in the reserve line.

When the ships of a fleet are in the first or second order of sailing, and it is intended to form the line of battle, it is evident that by simply hauling the wind, or by tacking (TACKING) or veering (VEERING), as the case may require, the ships may get into each other's wake in any proposed direction of the line. If it be intended to form the line of battle from the third order, the ships in that wing which is already in a line, in the direction of their keels, must simply haul their wind and get into each other's wake in the proposed direction of the line; each ship in the other wing is then brought into a position nearly at right angles to the direction of the wind, and, as those of the first wing advance, those of the other fall in to their wake.

When the line of battle is to be formed from the fourth or fifth order, all the ships being supposed to be close-hauled, the formation may take place upon any one of the divisions: the ships of this division are then brought to (their motion stopped by bracing square sails so as to be taken aback by the wind while others are kept full,) and the other ships are made to take up their proper positions in the prolongation of the line thus formed. If, for example, the fleet consists of ships sailing in three divisions close-hauled, and the line is to be formed upon the centre division, as in the subjoined diagram; then, as soon

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is on the weather side of the fleet to become the centre or rear column, or by making the centre or lee column constitute the van of the line. A like interchange of the places of the van, centre, and rear divisions is also, occasionally, made when the fleet is in the order of sailing; and various other evolutions are permitted by the ships of a fleet, both while sailing and in the line of battle: the principal of these consist in the several ships tacking, or veering, in succession, and in turning to windward; and there are, besides, the series of movements which are necessary to re-form the line of battle when disorder in consequence of a shifting of the wind. But the details of these evolutions can be studied with advantage in works which are expressly written on naval tactics.

First of all, it is necessary to return to some of the orders of sailing; and with respect to the three first of these, it will be merely necessary for the ships in the line to tack, or bear away, in the assigned directions, increasing or diminishing their speed nearly at the same time. In returning to the fifth order of sailing, there are two cases, which consist in performing the manœuvres on the same and on the opposite tack. In the first case, should a slight wind arise, the admiral may van may become the weather squadron, the van and centre tack together and stand on, while the rear proceeds in its actual course; then, when the rear comes successively abreast of the centre and van squadrons, these re-tack, and thus three parallel columns are formed. In a heavy wind, the admiral may make the weather squadron, the ships in the van first tack in succession, then the ships in the centre, and lastly those in the rear. All then keep on, till the corresponding ships in the different squadrons get abreast of one another. The evolutions differ, of course, from those just mentioned when the van is to form the lee, and when it is to form the centre squadron.

In the order of retreat before the wind, the ships are divided into two equal divisions, the squadrons making an angle of 135 degrees with each other; the admiral's ship remaining to windward of the rest of the fleet, and being at the angular point.

If a fleet is much superior in force to that of the enemy, it will be of little moment whether it comes to action on the windward or the leeward side; and of each of these situations when taken, either by a fleet or a single ship, has both advantages and defects. The advantages of gaining the weather-gage, as it is called, are that in such an instance a fleet may change that of the enemy, and it may commence the engagement when it shall appear most convenient: ships may be detached to the rear in order to turn the enemy's line and put it in confusion, and the whole fleet may retire. The manœuvres on the weather side are but little incommoded by the smoke. On the other hand, the disadvantages of being on the windward are, the difficulty of retreat without passing through the enemy's line; disabled ships cannot quit the line, and, in severe weather, the lower-deck ports can seldom be opened. When a fleet is to leeward of that of the enemy, the ships which may be distanced may be readily drawn away, and the whole fleet may retire if unable to contend against a superior force.

If a fleet to leeward of the enemy's line should attempt to gain the windward side, it should manœuvre so as to delay the engagement for a time in the hope that a change of wind without disordering the rest of the fleet, and in stormy weather, the lower-deck ports can seldom be opened. When a fleet is to leeward of that of the enemy, the ships which may be distanced may be readily drawn away, and the whole fleet may retire if unable to contend against a superior force.

In order to double a fleet, the ships should advance beyond its van, or fall in its rear, when by turning or veering to the windward as the enemy may bear off to windward of the line, they may get into the required position on its opposite side. It is right to observe however that this manœuvre ought to be attempted under favourable circumstances only, as no ships are liable to be separated so far from their own fleet as to be prevented from rejoining it; and it is, on the whole, considered more advantageous to double a fleet by its rear than by its van, since in the event of some of the enemy's ships being unable to follow their own fleet, or if, when they are in their rear, such ships may be taken by those which are performing the manœuvre of doubling: should any of these last be separated from their fleet, they can remain in the rear without risk, till an opportunity is offered of rejoining it. At the battle of Varenna, Admiral Niel doubled the van of the French line, and attacked it on both sides, while the other ships of that line, the whole fleet being at anchor, could afford no assistance. In order to avoid the turning or veering of the ships of a fleet, they ought to be in the vanguard or rear of its line when in action; and the rate of sailing for each should be such that the rear ships may never be at the mercy of the enemy. Care should also be taken that the ships are as close together as possible, as the manœuvre must appear between any two of them, and thus break the order of battle.
It is well known, from the records of naval history, that the manœuvre of cutting through the line of an enemy's fleet during an engagement has been several times performed with great success, and I may even say, with decisive victory, in the middle of the seventeenth century. In an action with the Dutch, in the year 1652, Sir George Ayscue is said to have charged from the leeward through the fleet of the enemy; and in that between the English and Dutch near the Sandwich cut through the centre of the Dutch line, and caused the disorder which ended in its total defeat: again in May, 1672, Sir Joseph Jordan, of the Blue squadron, having the advantage of the wind, pierced the Dutch fleet and threw it into confusion. But it is the manœuvre which Sir Charles Douglas (Sir Charles Rodney's flag-captain) his whole system of tactics in the year preceding that in which the battle with the Comte de Grasse was fought. The accuracy of this assertion has been disputed by Sir John Douglas, in his 'Memoir on Naval Evolutions,' and from a close examination of the circumstances under which the manœuvre of breaking the French line was performed, as they have been given by Sir Charles Dashwood (one of Admiral Rodney's aides-de-camp) on the day of the action, it appears that the idea of the manœuvre was, at the moment, suggested to the admiral by Sir Charles Douglas on perceiving an opening in the French line between two of the ships near its centre. The French fleet was formed in line on a larboard tack, and tended to gain the wind on the British line, which went from the leeward side advanced obliquely towards the fifth ship from the van of the enemy. Signals were then made for the British ships to close up in their line, and the action commenced as the two fleets ranged in opposite directions along side of each other. When the centre of the British fleet came opposite the third or fourth ship of the French line, Admiral Rodney's ship began a close action within half musket-shot against the ships of the enemy with which it was successively abreast; and then the opening appearing as above mentioned, the opportunity was seized of passing through it: this was done so near the enemy, that the admiral's ship almost touched the French ship on each side. The ships astern of the admiral followed him closely, and took possession of the port fire against the ships in the rear division of the enemy's fleet, which, being driven to leeward as the van of the British fleet passed them, broke into two divisions, and made sail before the wind to escape. As soon as the van of the French fleet was left behind the rear of the still advancing line of British ships, it also broke into two divisions, which retreated in different directions; and then the signal being made for the ships to close up, the British fleet followed in pursuit of that division with which the French admiral had retired. At the battle of Trafalgar (1805), the combined French and Spanish fleets were drawn up in one line, of a crescent form, the convex part being to leeward of the wind, while the fleet of Lord Nelson bore up against it in two lines, in the order of sailing: the leading ships of the lines broke through the fleet of the enemy in two places, and were followed by those of their respective divisions.

The manœuvre of breaking the line of a fleet, like that of charging in column of the line of an army, may not always succeed; and in the action, June 3, 1665, several squadrons passed through and through the Dutch fleet without gaining any advantage. If the line of the enemy is strong, the ships of a squadron may be placed between two fires, or may be cut off from the rest of their fleet; and perhaps the manœuvre ought not to be attempted unless the line to be broken is already disordered by the action, or unless a favourable opportunity should present itself from negligence or want of skill in the enemy.

Should sufficient reasons exist for performing the manœuvre by a fleet which is to leeward of its enemy, the ships of that fleet should close up as much as possible, and by a press of sail get rapidly through the opening without attempting to engage the ships between which they pass; or each should give the fire of a broadside to one only, reserving the other broadside for the ship with which it is to engage in the new position: this position the ships should from course gain as soon as possible. On the other hand, an attempt to break the line of battle may be counteracted by causing all the fleet, as soon as some of the enemy's ships have got through, to put itself on the same tack as these; by which means some of them will be engaged between two fires, and others will be cut off from all connection with the fleet to which they belong.

When the commander of a ship intends with that ship to come to action with one of the enemy to leeward, he should bear down obliquely towards the latter till he gets nearly into its wake; and when at a proper distance, he may either run on alongside, or having shot a-head, veer and run down on the weather bow: the ship attacked should never be allowed to bring her broadside to bear except when both ships are in parallel positions.

In chasing an enemy's ship which is to windward, the chaser being presumed to sail better than the ship she pursues, it is recommended that the former should stand on close-hauled till abreast of the chase; she should then tack, and stand on close-hauled till again abreast; and so forth.

The ship chased, on the other hand, should, in order to avoid loss of time, continue constantly, if possible, on one course; but it is evident, from the supposed inferiority of her sailing, that she must at length be overtaken by her pursuer.

(Traité des Évolutions Navales, par P. Paul Hoste, 1690. A Translation of the same, by Captain Boswall, R.N., 1834; Clerk's Essay on Naval Tactics, 1780; Naval Evolutions, by Major-General Sir H. Douglas, 1822; L'Art de Guerre, par Mr. le Viscounte de Greurer.)

TACLAVERA [YORKSHIRE].

TADEO, SAN, ríver. [PATAGONIA.]

TADOMAR [PALMYRA].

TADORNA, Dr. Leach's name for a genus of Ducks, having the bill very much flattened towards the extremity, and elevated into a protuberance or projecting boss at its base.
rhynchus, Vieill.; Alcetara, D'Orb. et Lafi.; Muscipula, Cuv.

Alcetara, Vieill. (Alcetara, Sw.; Yetapa, Less.; Xenurus, Boie: Gallita, Vieill.; Platyrhynchus, Spix; Muscipula, Cuv.; Muscipula Steph.; Muscipippa, Lea.)

Gubernetus, Such. (Mucicapta, Licht.; Tyrranus, Cuv.).

The Tamniontinae are placed between the Querulinae and Tyranninae. (List of the Genera of Birds, 2nd ed.

TAFFI, ANDREA, born at Florence, in 1213, deserves mention as having been the first who introduced among his countrymen the art of painting in mosaic. Having heard of some eminent Greek artists who were executing public works in the country of the Saracens, and being greatly desirous to visit that city and formed an intimate friendship with Apollonius, one of the principal of those artists, and prevailed on him to accompany him to Florence, to teach him the best manner of working in mosaic, and the method of composing the most durable kind of cement.

On their arrival at Florence they executed together several works, which were highly admired. Taffi's chief performance was a Dead Christ, of large dimensions, in a chapel at Florence. He died in that city, in 1294, at the age of eighty-two.

TAPILET. [MAROCCO.]

TAGANROG is a town in European Russia, in the government of Ekaterinoslav, near the north-eastern extremity of the great river watercourses into the sea. Its area is 150 ac. 9 roods 10 perches. It stands on the summit of a lofty promontory, commanding an extensive prospect of the Sea of Azof and of all the European coast to the mouth of the Don.

Azof itself is visible from the heights of the citadel in fine weather. It was founded in 1689 by Peter the Great, and became a very flourishing place till he was obliged to abandon it to the Turks by the peace concluded with Russia in 1711. Catherine II. intended to revive the plans of Peter the Great, but these were not commenced and completed till the reign of Alexander. It is most advantageously situated for carrying on a extensive commerce, but the bay or road is so shallow that only ships of moderate burden can enter it, and even these must be lightened of part of their cargo at Keritch or Feodosia. Besides this, it is only during a few months in the year that any trade can be carried on, because the Sea of Azof being frozen in the winter from December to March, the sea from the mouth of the Don to Taganrog is covered with such thick ice that sledges cross it in safety to Azof and Tcherkatsk. Notwithstanding these impediments the commerce of Taganrog is very great; for it is the chief place for all the intercourse between the provinces on the Don and those on the Black Sea.

By a ukaze, issued in 1833, all ships liable to quarantine were prohibited from entering the Sea of Azof, and the number of arrivals is reduced to less than 100; notwithstanding this, the exportation to foreign countries has increased, the number of coasting-vessels being more than double what it was before. It must be observed that in speaking of the trade of Taganrog, that of the two neighbouring towns of Rostoff and Nakhitchevan is included, all vessels going to those places being registered at one station. Taganrog has now about 17,000 inhabitants, chiefly Greeks, a gymnasium, ten churches, three of which are of stone, dockyards, large and numerous warehouses, and many very handsome private dwellings. The climate is temperate and remarkably healthy; the surrounding country is fertile, and produces excellent fruits and culinary vegetables; wheat sown in unmanured land yields from twenty to thirty fold. The vine and the mulberry tree, in these parts greatly encumber the field, which is partly under the cultivation of the emperor Alexander, who died here on the 1st of December, 1825.

(Tagus Journal; Conversations Lexicon; Schmitzler, La Russie, la France et les Indes de l'Exterieur; Hassell; Cannich; Stein.)

TAGUS, called Tyjo by the Spaniards, and Tejo by the Portuguese, is the largest river of the Spanish Peninsula, which is divided between these two nations. The rivers by the confluence of which the Tagus is formed originate in the highest part of the table-land which occupies the interior of the peninsula, between 40° 25' and 41° 5' N. lat., and 1° 30' and 3° 30' W. long. In the elevated mountain-mass of Sierra Morena, on the east, the river ran; it divided into three rivers, the Molina or Gallo, the Tagus, and the Guadiela, which flow west-north-west between high ridges and in narrow valleys. The Molina and Tagus unite on the boundary-line of the provinces of Soria and Cuenca, and, after a south-west course, are joined by the Guadiela, where the three provinces of Cuenca, Guadalajar, and Madrid meet. The united river continues to follow a south-west direction until it enters the more open country, which it turns to the west, and is joined by the river Jarama, or Xaruma. This river is formed by three rivers, which rise in the range that divides the table-land of New Castle from that of Old Castle, the Tajuña, Henares, and Jarama or Xaruma. The last-mentioned river, the Xaruma, is the most western, and originates on the Soma Sierra, near Buytrago. It runs south, and is first joined by the Henares, which flows south-south-west, and then by the Tajuña, which runs from its source to its mouth nearly parallel to the Henares and the Tagus, in the tract which divides these two rivers. The Tajuña joins the Xaruma a few miles above its confluence with the Tagus. The country which is traversed by these branches of the Tagus is not much elevated above the sea, and possesses a considerable extent of agricultural land, fertility, and is the most populous tract on the table-land of Spain. The Xaruma joins the Tagus a little below Aranjuez, and at this place the river flows through a wide level plain very little elevated above its bed, and so fertile, that it is truly called the Garden of Castile. From this place the general course of the Tagus, as far as it lies within Spain, is nearly due west. Below Aranjuez the bed of the river gradually sinks deeper beneath the surrounding country; the banks are steep, and the current is rapid. Many miles westward, and in which it is joined by the rivers Guadarrama and Alberche from the north. Below the town of Talavera de la Reina the Tagus enters a hilly country, where it flows with great rapidity in a south-westerly direction, which is joined from the north by the rivers Tietar and Alagon, which descend from the high ridge that divides the table-land of the two Castiles. The Alagon originates in the icy masses which cover the summit of the Sierra de Guadarrama, in the month of March, and the river which this river brings down is so considerable, that from the place of confluence at Alcantara the Tagus becomes navigable. Though the Tagus has run above 300 miles before it reaches Alcantara, not part of it is navigable, and the same part continues to be without navigation to the current through the plain of Castile. Besides this, the greater part of its course is through narrow valleys, between steep hills, from which heavy masses of rocks have fallen down, which in many places greatly encumber the bed of the river, and cause rapids, which continue for sever miles; but the greatest impediment to the navigation of the river is the small volume of water. The soil of the table-land absorbs a great quantity of moisture without delay, and at the same time, the small quantity of water which falls on this region is much less than what falls in other parts of Europe; consequently the river is scantily supplied with water, except during the few months when the rains are more abundant.

At Alcantara the level of the river is probably less than 300 feet above the sea, and it has still a course of about 200 miles to its mouth. Its course below Alcantara is as far as Abrantes, or rather the mouth of its tributary the Sado, the same as it has from the time of the last fall, which constitutes the boundary-line between Spain and Portugal. In this part of its course the river is navigable, but the navigation is extremely tedious and not without danger. The sandbanks and shoals are very frequent, and can only be navigated by small flat-bottomed boats. The Zêzere, in which the numerous rivulets unite which collect the waters originating on the southern declivity of the
rocky masses of the Serra de Estrella, always brings a considerable volume of water to the Tagus, and from this point downwards the river may be navigated by vessels of 130 tons burden. In this part of its course numerous islands occur, which at first are small and rocky, but lower down are larger and alluvial. The larger islands are called Lizerias. Below these islands the river expands into a lake-like basin, which extends from north-east to south-west, in the direction of the course of the river, nearly thirty miles, and is mostly about twelve miles wide, but in several places it is narrowed to six miles by projecting headlands. The country north-west of the basin is covered with gently-sloping hills, the offsets of the Serra da Cintra, and on the south-east of it is the sandy plain of Alemtejo. The most western part of the basin constitutes the harbour of Lisbon, which is spacious enough to contain all the fleets of Europe.

Where the town of Lisbon terminates on the west, the Tagus turns westward, and a broad rocky headland, consisting of high hills, advances northward, and narrows the basin to about one mile or a little more in width. At the same time the offsets of the Serra da Cintra come close up to the river on the north, so that the Tagus passes to the sea between two rocky masses. The whole course of the Tagus exceeds 550 miles, and the area of the country drained by the river probably does not fall short of 40,000 square miles.

Tagus is the name of this river in the Roman writers, which has been adopted in our language.

(Mifsano’s Diccionario Geografico de Espana y Portugal; Link’s Travels in Portugal, &c.; Semple’s Observations on a Journey through Spain and Italy, &c.)

TAI, ESTATE. [ESTATE TAIL.]

TAIN. [Ross and Cromarty.]